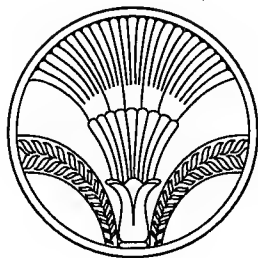


EUGENICS

*Twelve University
Lectures*

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EUGENICS:
Twelve University Lectures

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Twelve University Lectures

BY

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WITH A FOREWORD BY
LEWELLYS F. BARKER

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EXPLANATORY NOTE

THE lectures contained in this volume were selected from among a number given in various universities and colleges throughout the country in the scholastic year of 1912-1913. They were arranged for in the belief that the most necessary step to be taken towards the end of awakening a eugenical conscience, and thus paving the way to an effective operation of public opinion and to wise legislation along eugenical lines, must be that of education. Therefore, the purpose has been to have the subject of eugenics — what it means, what the necessities for it are, and what are its aims — put clearly and forcefully before as many undergraduate student bodies as possible.

It being found impracticable to provide for a lecture at every college or university, those twenty-eight were chosen which had registered over two thousand students, and to these were added Wellesley, Vassar, Bryn Mawr, and the University of Virginia. Each of these institutions was then offered an honorarium for a lecture on eugenics to be prepared and delivered by a suitable member of the faculty. This accounts for the repetitions which are found in the volume, although an earnest effort has been made to minimise them. The value of this repetition lies in that it will at once appear, to any reader not already familiar with the subject, that these are not views expressed by a small group of people influenced by each other, but that on the contrary thinking men in various parts of the country concur in the same general belief and admit the same general premises.

L. J. W.

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FOREWORD

WHEN Sir Francis Galton founded, in London, the Eugenic Laboratory known by his name, National Eugenics was declared to be "the study of agencies under social control that may improve or impair the racial qualities of future generations either physically or mentally."

The problems of eugenics are as old certainly as historically recorded human life. They were discussed, in some of their fundamental features at least, among the Hebrews at the time when the Bible was written. Plato deals with them in a famous chapter in the *Republic*. But the attempt to create an actual science of eugenics was first made toward the end of the nineteenth century after the principle of evolution had become widely accepted and thoughtful men and women had adopted the creed that man himself, like all other objects, animate and inanimate, is subject to the reign of natural law.

The progress of physics, chemistry, and biology has made possible so many beneficial practical applications of these sciences that human beings, more than ever before in the world's history, have come to appreciate the value of accurate knowledge as a guide to conduct. Wherever man has begun to know scientifically, he has found himself also, better than before, able to predict; he has gained the power to control. This increase in

power to control has only whetted an appetite which appears to be insatiable; man now strives for ends which his ancestors would have regarded as presumptuous in him to try to reach. Thus, to-day, he not only utilises these forces of nature to improve the conditions under which he lives, but he is determined, if possible, to beget a better and a nobler race to succeed him.

The crude selective processes of nature have through the struggle for existence and the elimination of the less fit gradually led up from lower man to the man of our time. But modern man is a sympathetic being. He tries to prolong the life of the defective and the diseased. Instead of killing the criminal, he attempts to reform him. Instead of allowing children who have a feeble resistance to tuberculosis to die, he keeps them alive and they grow up, perhaps to transmit their weakness to offspring. He prevents epidemics. He limits the exterminating influences of alcoholism, and of poverty. Thus modern charity, modern philanthropy, and modern medicine combine to interfere with that *selective death-rate* which, biologists tell us, has, hitherto, played an important role in race-betterment.

In view of this remarkable change in conditions, thoughtful men are asking themselves a new question. It is this:— Can man, from now on, through the use of his intelligence, learn enough about the influences of heredity and environment to permit him consciously and successfully to act in the direction of a *selective birth-rate* which will compensate, or more than compensate, for the race-impairment threatened by his conscious interference with the selective death-rate? So-

called eugenists are optimistic and believe that he can; they assert that he already knows enough to permit of some practical applications of the eugenic science. Though granting that man will never be able consciously to direct the processes of improvement of his racial qualities in any way comparable to the control exercisable by experimental breeders of plants and animals, they feel that through the scientific study of heredity and dissemination of knowledge among the people, ideals may be gradually fostered regarding parenthood which will go far toward improving the inherent qualities of the human race.

Certainly, a vast deal of nonsense is being talked and written about eugenics. The word is in the mouths of many laymen, who have no conception of its real meaning. The quack doctors of society have seized upon it, exploiting its popularity, to advance in favour their own pet panaceas for social reform. True eugenics is, at present, in less danger from its avowed enemies than from those who masquerade as its friends. Hasty and ill-advised legislation is preceding not only the cultivation of public opinion, but also that solid foundation of demonstrable fact which alone would justify law-making. Surely much harm may easily result from eugenic zeal without sufficient eugenic knowledge!

It is gratifying to know that careful studies of eugenic problems are now being made in this country. The organisation of the Eugenics Record Office at Cold Spring Harbor marks the opening of a new period in eugenic study and in education along eugenic lines in the United States. Those who harbour eugenic ideals

should be under no illusion, however, as to the rapidity with which real progress can be made. It will take a long time to lead even the more thoughtful of the people into a full understanding of the nature and importance of the principles of eugenics, and there does not seem to be any probability that the people as a whole will in the near future be led to think or act in accordance with these principles.

It was a recognition of the need of educating younger people of the better sort regarding eugenics that led Mrs. Huntington Wilson to provide a lecture on the subject in each of a large number of American universities last year. The present volume makes certain of those lectures generally available, and the perusal of them will doubtless lead many readers to pursue the subject further.

Among the books and articles dealing with eugenics the following may be mentioned as especially suitable for those approaching the topic for the first time: —

1. Karl Pearson, *The scope and importance to the State of the science of national eugenics*, Lond., 1911.
2. Karl Pearson, *The groundwork of eugenics*, Lond., 1912.
3. Karl Pearson, *The problem of practical eugenics*, Lond., 1912.
4. D. S. Jordan, *The heredity of Richard Roe*, Boston, 1911.
5. W. E. Kellicott, *The social direction of human evolution*, N. Y., 1911.
6. C. B. Davenport, *Heredity in relation to eugenics*, N. Y., 1912.
7. H. A. Miller. *The Psychological limitations of eugenics*. *Pop. Sci. Mo.*, April, 1914.

8. H. H. Goddard, *The Kallikak Family*, N. Y., 1912.

9. The various publications of the Eugenics Record Office, Cold Spring Harbor, N. Y.

Much good, it must be believed, will result from efforts directed toward increasing our knowledge of heredity and toward educating the people as a whole concerning the facts of heredity. When people are made familiar with the facts, they will, themselves, find the way practically to apply them. Thus, the cultivation of a healthy public opinion regarding marriage and parenthood will, it seems probable, be more efficient in promoting eugenics than anything that can be done by way of legislation, at any rate at present. As knowledge increases, it seems likely that more and more people will voluntarily apply to reputable physicians for their approval before undertaking marriage or the responsibility of parenthood. Already a number of clergymen favour the plan by which applicants for marriage, submit voluntarily, along with their licenses, medical certificates of health and fitness.

LEWELLYS F. BARKER.

EUGENICS:
Twelve University Lectures

I

THE EUGENICS PROGRAMME AND PROGRESS IN ITS ACHIEVEMENT

C. B. DAVENPORT

EUGENICS is a branch of applied biology which looks toward the improvement of racial qualities. The corner stone of the science is the biological fact that man is not a single homogeneous "species" but is composed of numerous elementary species — or the potency of such —; races which are often concealed on account of the extensive, almost universal, hybridisation that is going on in mankind. The programme of eugenics is to secure in our population as large a proportion as possible of persons belonging to the strains whose traits are of the greatest value to our social order.

Since the term is sometimes loosely applied, it is necessary to state expressly that eugenics is to be distinguished from sex hygiene; though it is easily seen that venereal disease has certain relations to eugenics, among others, in leading many young women of good stock to fear the consequences of marriage, to refrain from it, and so to fail to perpetuate their excellent traits. Eugenics is likewise not "prenatal culture," though there is no doubt that the protection of the fetus from alcoholic and other poisoning and from infection is a good thing for the development of the child after birth and for him as a potential parent. The dignity

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of the connotation of the term eugenics has caused it to be seized by a great variety of enterprises, such as baby shows and contests, and even pure milk committees. These are all useful undertakings, but it does a grave harm to the progress of a matter of the greatest public concern to appropriate its name for another and a special interest, because it confuses the public as to the real scope and aims of eugenics. In the long run it will be bad for the undertakings that are improperly appropriating the name; for the public is rapidly coming to discriminate between the proper and the false content of the term and to feel unkindly toward the propaganda that is assuming a name falsely.

The interests of eugenics in the different countries are in the hands of various societies. The American Breeders' Association (now The American Genetic Association), started in 1903, early organised a committee on eugenics which, in 1910, was expanded into a section of eugenics. Its work has been done with the assistance of a number of sub-committees (or committees) and especially with the Eugenics Record Office. The Association publishes the *Journal of Heredity*. In June, 1911, and again in June, 1912, a conference of eugenical field workers was held at Cold Spring Harbor, and in June, 1913, at a third conference, a Eugenics Research Association was organised to comprise those engaged in, and those superintending, eugenics field work and also scientific students of eugenical data. In England, the Eugenics Education Society was established in 1909, maintains a quarterly magazine called *The Eugenics Review*, organises courses of lectures, and was instrumental in carrying out an International Eugenics Con-

gress in London, 1912, of which, by the way, the next meeting is to be held in New York City, September, 1915. The English Eugenics Education Society has branches in New Zealand. In Germany, Dr. Ploetz has organised an Internationale Gesellschaft für Rassenhygiene of which the *Archiv für Rassen- und Gesellschafts-Biologie* is the organ. In France a national society was organised a year ago; in Hungary one was established last spring.

Of institutions, there is the Francis Galton Laboratory of National Eugenics at London, directed by Professor Karl Pearson; it issues a *Treasury of Human Inheritance* and other publications. In America, Alexander Graham Bell founded, about 1888, the Volta Bureau which has fulfilled the function of a clearing house for family data relating to the deaf. In October, 1910, there was started at Cold Spring Harbor, N. Y., the Eugenics Record Office, made possible by the interest and the gifts of Mrs. E. H. Harriman. This office trains field workers who study, for state (and other) institutions, the family histories of the inmates. It has also a staff employed on special investigations. It preserves and indexes family records thus secured and also the "Records of Family Traits" and scattered data supplied by numerous volunteers. Its publications consist of a *Bulletin* series (11 numbers) and *Memoirs* in quarto (two numbers already issued). Besides Mrs. Harriman, the work has been supported by Mr. John D. Rockefeller and others. Its scientific work is directed by a board consisting of Alexander Graham Bell, chairman; William H. Welch, vice-chairman; Lewellys F. Barker, Irving Fisher, E. E. Southard and

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C. B. Davenport, secretary. The superintendent is H. H. Laughlin.¹

Of books on eugenics and human heredity many have been written by Galton, Saleeby, Ellis and the Whet-hams in England; by Jordan, Kellicott, Woods and others in America. Of books on heredity (including eugenics) may be mentioned those of Bateson, Castle, Punnett and Walter.

Studies in eugenics soon reveal the importance of "race" and, as stated above, lead to the conclusion that any population is a hybrid mixture of numerous incipient races. There are not many pure races. Even Africa has been penetrated through and through by Arabs and other non-black peoples. Even the American Indians were not a homogeneous people. Now these different species have different mental and physical characteristics and in so far as they have entered into the blood of any country (as they have into the blood of the United States) they complicate the topic of eugenics — a subject which is concerned so largely with hereditary traits.

Eugenics has also relations with families and the study of genealogy. For as there are racial characteristics so there are also family characteristics, and these are maintained, despite widespread hybridisation, by two processes; first by consanguineous marriages which are commonest in islands, mountain valleys, rural com-

¹ Since this lecture was delivered Mrs. Huntington Wilson has provided for educational extension work in connection with the Eugenics Record Office, and the services of A. E. Hamilton, M.A., have been secured for this purpose. Lectures on eugenics will be given before such clubs, societies, churches and educational institutions as may request them.

munities and places with a minimum of intermigrations, and second by homogamy, or "like marrying like," which holds everywhere. The consequences of the latter process are to create families of statesmen (Harrison), of financiers (Morgan of Connecticut), of scholars (Edwards-Dwight), of inventors (Wilkinson), of soldiers (Lee of Virginia), of naval men (Hull-Foote), of actors (Jefferson). Such may be called aristogenic. On the other hand there are produced families of the feeble-minded, of the criminalistic, of deaf-mutes, of the tubercular. Such families may be called cacogenic. Cacogenic families are illustrated by the Jukes, the Ishmaelites, the Nams, the Hill Folks, and the Kallikaks. These examples of aristogenic and cacogenic families are evidence of a real social stratification in our population. Despite our boasted ideal of social equality, the unconscious factors of marriage selection, stronger than paper theories, have brought about the persistence of many family characteristics.

Eugenics rests on heredity, for permanent social improvement depends on the acquisition by the race of good hereditary traits. The great advance that eugenics is making to-day depends largely on improved methods of studying heredity which give results that are more utilisable than by the old methods. By these methods our knowledge of heredity in plants and animals has enormously increased; new laws, new points of view have been gained and new methods of analysing data have been acquired. As a result of these studies we know that iris-pigment, dark hair-pigment, curly hair, dark skin colour, normal mental development, normal mental "stamina," normal resistance to epileptic convul-

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sions are all positive traits. When absent from both parents their absence is to be expected in all children. When present in either parent their presence is to be expected in at least half the children. Other traits which are more or less probably inherited as positive characters are short stature, slenderness, inability to express oneself adequately in music, painting, literature and mechanics.

Among diseases the *normal* condition seems probably to be the positive (dominant) condition in the following: — hereditary ataxia, astigmatism, otosclerosis, Thomsen's disease, alkaptonuria, and, possibly, in non-resistance to consumption.

In other diseases the *abnormal* condition seems to be the positive (dominant) condition. This is true with more or less probability in *Huntington's chorea*, coloboma, or imperfect closure of the iris (?), microphthalmia, *cataract*, displaced lens, corneal opacity, ptosis and other imperfections of the muscles of the eyeball and lid (?), retinitis pigmentosa, night-blindness, epidermolysis bullosa (?), *tylosis* (or skin thickening), *monilothrix* (or beading of the hair) *spottedness of hair coat*, *epistaxis* or nosebleed (?), teleangiectasis, *diabetes insipidus*, *hypospadias* (males only), achondroplasia, or imperfect development of the skeleton, *syndactylism*, *polydactylism*, and *brachydactylism*.²

Still other traits are sex-limited. Typically, such sex-limited traits show themselves only in males; these males do not have affected children and their sons, in-

² Italicised names are those of diseases that have been best studied, and of whose method of inheritance we are best assured. Names followed by a query (?) are those of diseases whose inheritance has not been sufficiently studied.

deed, do not carry the defect in their germ plasm. But the daughters do carry the defect in half of their germ cells and since the sons of such a woman have an equal chance of coming from tainted and non-tainted germ cells, half of the sons will show the defect. But the sisters (unless their father show the defect somatically) will not show it though half of them may transmit it to half of their sons. The following cases have not all been worked out completely; some pedigrees even show apparent exceptions, but the rule as given above seems to hold for them as a first approximation. These sex-limited traits are: *colour blindness, atrophy of the optic nerve, hæmophilia, muscular atrophy, multiple sclerosis, nystagmus and myopia* (in some families).

While many traits of man are clearly due to a single factor, others are complex and due to two or more factors. Thus the skin pigment of the full-blooded West Coast African negro is produced under the stimulus of two duplex (four somatic) determiners. Consequently inheritance is complicated in this case.

The great work of the future in eugenics is to determine as accurately as possible the law of heredity of each human trait.

Eugenics as a social science in its application to normal stock is effective, however, only if it is applied; and if persons actually make use of its conclusions in selecting marriage mates. Here is where, in the minds of many, eugenics as an applied science is bound to fail. Every one knows, indeed, how powerful are the bonds of affection between a young man and a young woman who have fallen in love and how little influence the advice and protest of relatives and friends often has

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on the outcome. Nevertheless, young persons differ greatly in their control over romantic love and, above all, it is true that there is usually a long period intervening between first acquaintance and betrothal. Young persons fall in love gradually. This period should be one for considering not chiefly personal convenience or the social consequences of marriage, but for considering, above all else, the consequences to offspring. Here is where eugenic education may help with those capable of taking advantage of it.

Eugenics must inculcate the ideal of fruitful marriage of our best stock. Many of our best young men and women in college or professional schools have their personal ambitions aroused and ask themselves if marriage may not interfere with the highest realisation of their ambitions. The writer recalls discussions on this matter between graduate students over the dinner table at Harvard College. And he was personally impressed by the advice of a distinguished German professor against the marriage of those who wished to gain eminence in their professional career. Many a man at the opening of his life work vows, as Judge John Lowell of the middle of the eighteenth century did, as he was being graduated from Harvard College, that he will never marry. But nature was too strong for John Lowell and he married three times and among his descendants was the director of a great astronomical observatory, the president of Harvard College, a principal founder and promoter of the Massachusetts General Hospital and the Boston Atheneum; the founder of the City of Lowell and its cotton mills; the founder of the Lowell Institute at Bos-

ton; the beloved General Charles Russell Lowell and his brother, James, both of whom fell in the Civil War, and James Russell Lowell, poet, professor and ambassador; besides brilliant lawyers and men entrusted with large interests as executors of estates. Do you think John Lowell would have taken that vow could he have foreseen the future? No, if the German professor's conclusion was correct for Germany, I do not think it holds for this country. In my own Harvard class, among the 328 members there were in 1909, 287 surviving; of whom nearly a third (31 per cent.) had not married. Of these twenty-six were in "Who's Who in America." We should expect, were "success" in professional life promoted by bachelorship to find something over a third of those in "Who's Who" to be unmarried. Actually all but two, or less than 8 per cent., were married and one of these has since married. The only still unmarried man was a temporary member of the class and is an artist who has resided for a large part of the time in Europe. There is, therefore, no reason to believe that bachelorship favours professional success.

On the selection of marriage mates made by the rising generations depends the quality of the generation yet unborn — the generation that will be taking up the nation's burdens at the time those of us who are in middle life are dropping them. How momentous then for the nation are the betrothals that are taking place this year! Society has a right to inquire if a little intelligence has been displayed in the selections, or has it all been left to a blind instinct or to propinquity and convenience. Fortunately there is evidence that many

of the young people of the country do think very seriously about the consequences of the selection upon children. The Eugenics Record Office has prepared a schedule for recording family traits of both of the interested persons, that these may be filled out and submitted to the Eugenics Record Office for such advice as can be given. The task of filling out the schedule is considerable and only about two per cent. of those sent out in response to requests have (so far) actually been filled out and returned. In two cases where an adverse finding was rendered on the report we were informed that the finding would be followed, and that the engagement had been broken off. Fortunately, in most cases, there has been no obvious need for an adverse report. Of course, lack of knowledge of the inheritance of many traits limits our ability to advise. The interested pair are always given the benefit of any doubt or lack of knowledge. The main point is that there are persons who seek advice for the sake of possible children, and there are those who have had the will power and the courage to break off an engagement of a marriage which if consummated would almost certainly have resulted in defective offspring. The mating of the more intelligent of our stock is to a certain extent under social control.

The lowest stratum of society has, on the other hand, neither intelligence nor self-control enough to justify the State to leave its matings in their own hands. On the contrary, the defectives and criminalistic are, so far as may be possible, to be segregated under the care of the State during the reproductive period or otherwise forcibly prevented from procreation. State laws per-

mitting the sterilization of institutional cases have been passed by a dozen state legislatures. There is reason for believing that if executed at all they will be administered conservatively. It is desirable that the States should proceed slowly in this matter of sterilisation as a substitute for segregation. But in some way or other the reproduction of defectives must be controlled.

But it is not sufficient to secure good matings and cut off the bad. The eugenic marriages must be fecund and must equal or exceed the fecundity of the cacogenic matings. No fact is more startling to-day, and fraught with greater danger to the commonwealth, than the low fecundity of our best blood. From 1193 bachelors of arts of Bryn Mawr College since 1888 there have been produced to January, 1913, 263 girls all told. Twenty years after graduation, close to the reproductive limit, 328 graduates of Harvard in my class have reproduced 195 sons to take their place. An earlier class of 278 persons, twenty-five years after graduation, had produced 141 sons, or had only about half reproduced itself; and no account is made of infant deaths. Assuming that a class matures half as many sons as it graduates and that their descendants do the same for six generations, 1000 Harvard graduates of the 1880's will have sixteen male descendants of the 2080's. These sixteen sons will be ruled by the scores of thousands of descendants of 1000 of the Rumanians, Bulgarians, Greeks and hybrid Portuguese of the 1880's. Such figures must make one fear for the future. Some way or other the duty not only of marriage but of large families must be brought home to

our eugenic stock. The young men must earnestly seek to marry and to marry well, and to deserve to marry well by living a clean, wholesome, reasonable life. And the young women must be willing to make sacrifices of their personal ambitions, their freedom, their love of ease, to do the work that none others can do and which is a patriotic service not less sublime than that rendered on the fields of battle. But the sacrifices bring their own highest reward.

As I have intimated, it is, however, not merely the number born of children of the different stocks that determine their relative number in the community but the number who survive to maturity. The survival of the eugenic in greater numbers than the cacogenic is to be sought. We hear a great deal about infant mortality and child saving that appeals to the humanity and the child-love in us all. It is, however, always the saving of the lowest social class that is contemplated. I recall the impassioned appeal of a sociologist for assistance in stopping the frightful mortality among the children of prostitutes. But the daughters of prostitutes have hardly one chance in two of being able to react otherwise than their mothers. Why *must* we start an expensive campaign to keep alive those who, were they intelligent enough, might well curse us for having intervened in their behalf? Is not death nature's great blessing to the race? If we have greater power to prevent it than ever before, so much the greater is our responsibility to use that power *selectively*, for the survival of those of best stock; more than those who are feebleminded and without moral control.

But any programme for improving our stock is futile unless we take into account immigration and the possibility of controlling it selectively. Assuming that the annual addition to our population by births is 2,500,000 and that only 2,000,000 survive infancy, it is probable that between one-quarter and one-third of the annual increment of our population is through immigration. And, while we know something of the family history and "breeding stock" of those who are born here, we know practically nothing of the family stock of the million souls who immigrate here in the year. They are the greater menace to the country because they bring in so many unknown factors. Why do we so long delay finding something about the family history, the mental capacity, the moral control, of the stock from which our immigrants come? Why do we not take these things into account in passing them through our portals? Every social worker knows families in his territory all of whose children are a social menace because they are untrainable. Thousands of such persons are coming into this country every year, but we are not able to recognise them as such, by inspection. We take them into our communities and, as servants, even into our homes, when we would not take those of our own town of whose bad breeding we are aware. The eugenics programme can never disregard the, say, 30 per cent. annual increment of our population due to immigration.

Eugenics seeks to serve society and deserves a place among the agencies that tend to social amelioration. It does not minimise the value of education; it seeks to

increase the proportion of the educable and the degree of their response to educational efforts. It is not opposed to religion; it seeks to increase the proportion of those who can be emotionally controlled or who lend themselves more easily to religious and social influences. It does not find itself out of sympathy with efforts put forth for individual welfare. Physique, brain, and character must be cultivated; but that need must not render us blind to the fact that there are those who can not be improved by all of these social efforts and render it only the harder to help those who can be improved.

Thus the programme of eugenics stands; first, investigation; then, as knowledge grows, education. Finally, legislation based on sound public sentiment. For the carrying out of this programme the public is quite ready and indeed waiting. It is seeking to be wisely led.

II

EUGENICS AS VIEWED BY THE ZOOLOGIST¹

ROBERT H. WOLCOTT

To man is given the capacity of exercising dominion over all other animals, and if he so will, over himself. One of the early steps in the ages-long evolution which has raised humanity so far above the level of the beast was taken when man made subject to his will the animals with which he had previously contended on equal terms. Having harnessed some, they became tools in the subjugation of all. The period when our ancestors made the discovery that by breeding they could improve the quality and so increase the efficiency of these animals which they had domesticated is shrouded in the mists of ancient history. And so, indeed, is the name of him who first applied this concept to the human race. It entered into Greek philosophy and Plato emphasised the idea of the "purification of the State." Throughout the course of written history, in various nations, and under various guises, far-seeing men have urged plans for race improvement. As we, in tracing the course of history, approach nearer and nearer the present day we see these plans presented with increasing insistence. Science points out the parts played by inheritance and by environment in the development of the individual, and these plans fall into two categories

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— those that seek this improvement through bettered environmental conditions, and those that look for it to be most effective if brought about by better breeding; the former falling within the scope of eugenics, the latter that of eugenics.

Progress in the field of eugenics has been retarded by the difficulty of developing an educated and dynamic public sentiment. Biology has but just discovered the facts which could render potent the ideas of those who urged the principles of eugenics. The recent rapid growth of our knowledge, the placing of these subjects on a proper scientific basis, and the great increase of public interest in the questions they raise, are among the signs of the dawn of a new period in human history. Mankind is emancipating itself from blind obedience to what has been conceived to be natural and therefore divine law, and no longer looks upon itself as hedged about by divinely appointed limitations. We have harnessed the forces of nature and they answer to our bidding. We are now beginning to exert a certain control, as yet feeble, over the forces that operate in living matter, and to see that we hold in our hands the power to mould even our own destiny.

In order to understand what the possibilities presented actually mean we must consider briefly the structure of the body, the degree to which it is modifiable, how these modifications are produced and transmitted, and how we may exert a selective power over them. So far as man's physical nature is concerned, he is an animal, and his body is composed of that material — protoplasm, a proteid complex — of which the bodies

of all animals are composed, and in which alone, so far as we know, life phenomena are manifested. Highly complex, probably an aggregate of many different chemical compounds, and at the same time exceedingly unstable, protoplasm itself suffers a change with every modification of conditions in its surroundings or within itself, and thus is rendered possible the perfect adjustment which exists between an animal and its environment and the carrying on of the manifold activities of the living organism.

The smallest and simplest animals are composed entirely of a single bit of protoplasm or a single "cell," the larger and more complex of myriads of such cells. Within each cell, whether it exists as an independent organism or as a unit in a many-celled animal, the protoplasm is not homogeneous, but in different parts of the cell varies in physical and chemical characters. At some point in this cell is a sharply defined portion known as the nucleus, of a definite more or less regular form, more highly refractive to light than the rest of the cell, and showing under the microscope a network of material which, having a particular affinity for certain chemical dyes, is stained by them more deeply than the rest of the cell and is therefore known as chromatin. The remainder of the cell, or the cytoplasm, varies in consistency in different portions of its mass, especially during activity, and may contain non-living food particles, the waste matter remaining after the digestion of this food, and other products of cell activity, solid, liquid, or gaseous.

There is division of function within the cell. The presence of the nucleus is essential to the carrying on of

nutrition and the maintenance of the integrity of the whole, while this structure is also the active part in the cell-division or cell-multiplication by virtue of which animals increase both in size and number. It is believed that the chromatin of the nucleus is the substance which transmits the characters of the parent to the daughter cell, though the nature of that which determines the characters is unknown, as is also the mechanism of transmission. The cytoplasm is the seat of functions the performance of which requires exposure to the external world, as irritability, absorption, digestion, excretion, and respiration.

The one-celled animal performs in a very simple fashion all the functions possessed by the higher multicellular form. As the body of the latter develops by increase in the number of cells, these come to exist under a variety of conditions, some being exposed, others covered in, some coming under the operation of certain external influences, others under that of other stimuli, with the result that they acquire peculiarities in form and structure, as well as differences in chemical character and function. Thus by a process of differentiation we get muscle cells, nerve cells, digestive cells, and so on, each type of cell performing very well one or a few functions while losing the ability more or less completely to perform any other function. For a time this process does not prevent the cell giving rise to other cells by division, but as cells become highly differentiated they may lose this power completely. By artificially changing the conditions under which a cell exists we may modify the character of the differentiation, and impose on it a structure and function dif-

ferent from that which in the natural course of events it would have possessed.

A one-celled animal, then, is a single undifferentiated cell giving rise by repeated divisions to other similar undifferentiated cells, each of which maintains an independent existence, while the higher many-celled animals are made up very largely of differentiated cells quite incapable of giving rise to another animal and even, it may be, unable to reproduce themselves. In the latter case, reproduction of the individual is rendered possible by virtue of the fact that a limited number of cells, protected from the influences that cause differentiation, remain undifferentiated, and thus retain not only the power of repeated division but also those characters which were inherited from the parent, and which are passed on from generation to generation unchanged.

These undifferentiated cells are termed *germ cells* or *gametes*, and their protoplasm *germ-plasm* or *gametoplasm*, the differentiated cells which make up the bulk of the body *somatic cells* and their protoplasm *somatoplasm*. In all animals that display the phenomenon we call sex the gametes are of two types, and the small, actively motile male sex-cells or sperms are markedly different in every way from the large food-laden female sex-cells or ova. A new individual in such animals is normally produced by the union of a sperm and an ovum, or egg-cell, a process called fertilisation. It has been found that before fertilisation is possible both sperms and ova undergo a process of maturation, which involves not only the assumption of the peculiar form and structure which distinguish the ma-

ture sex-cells, but also as a result of division a change in the amount of chromatin. In any division of somatic cells the chromatin becomes broken up into separate portions and the number of these is always the same in the case of cells from the body of any one species of animal, while differing considerably in the case of those from the bodies of different animals. These portions are termed chromosomes, and since these each divide into two exactly equal parts in the division process, the two daughter cells produced by the division contain exactly equal amounts of chromatin and exactly the same number of chromosomes, each representing a half of one of the parent chromosomes. The mathematical accuracy with which this takes place is a strong argument in favour of the accepted view that the chromosomes are the bearers of hereditary characters, the equal division assuring to each daughter cell a precisely similar inheritance. In the maturation of sex-cells the number of chromosomes is halved and thus by the union of the two cells in fertilisation is produced as a starting-point for a new individual a cell with exactly the number of chromosomes characteristic of the somatic cells in the species to which the individual belongs.

We may picture a higher animal at the beginning of its development as an egg, a mass of germ plasm derived from a union of material from both male and female parents, carrying a load of hereditary potentialities derived in equal part from the two parents. In its development this germ plasm increases in amount and the egg cell is multiplied by repeated division; the resulting cells become in part modified to form cells of

various types, and thus evolve all of the various organs — bones, muscles, nerves, etc.— which make up the body of the adult animal. But somewhere within that body is left a portion of the undifferentiated germ plasm, retaining the same potentialities which it received from the parents, and transmitting them to the germ plasm contained in the egg which this individual produces, and from which, after the addition again of material from the other sex, is to be developed the next generation. Thus are passed on from generation to generation the characters which distinguish the species, the race, the strain, and even the more closely related individuals, the descendants from a common parentage; and these are transmitted essentially unchanged. Moreover, these represent properties of germ plasm as such, for by early separation of the cells produced by division of the egg cells of many of the lower animals we have been able to cause the development of two independent individuals from a single egg.

From what has been said it is evident that it is possible theoretically to distinguish clearly between two categories of forces acting in and upon the animal in its development. One includes the forces or tendencies inherent in the germ plasm, or those we call hereditary. By their operation are imposed upon the animal the characters which betray its relationship to other animals, the degree of relationship being indicated in a general way by the closeness of the resemblance which exists. The other category, which comprises those we call environmental, includes not only such forces or tendencies as act upon the body of

the animal from without, and thus belong to the environment in the narrow sense, but also those that act within the body but not in any degree whatever through the germ plasm.

By the operation of these environmental influences are produced many of the more minute differences which exist between even the most closely related individuals. Since no two individual animals can develop or indeed live under *precisely* the same conditions this individual variation is a universal phenomenon. We never are at a loss to recognise our friends even in the throng, we recognise chance acquaintances less readily, an expression familiar to all indicates our inability to recognise individuals of an alien race, and rare indeed is the person who can discriminate between individuals of the lower animal species. But it is none the less true that individual variation obtains throughout the animal world, and this variation may be germinal or somatic, hereditary or acquired.

This antithetical use of the terms hereditary and acquired is justified by the belief which a majority of biologists accept to-day that acquired characters are not in any degree inherited. The belief in such inheritance has existed from very ancient times and has until a generation ago been the prevailing one, but beginning with the clear distinction drawn by Weismann between germ plasm and somatoplasm, and accelerated by experimental work in animal breeding, the pendulum has swung the other way. Agreement has been prevented in part by lack of harmony in the ideas held by different biologists of what constitutes an acquired character. It is evident that every step in

the march of evolutionary development from the lower to the higher forms of animal life has been accomplished by the addition of characters which must in one sense have been acquired. But if we define an acquired character, as does Weissmann, as "any somatic modification that does not have its origin in the germ plasm," then we must agree with the majority and deny the inheritance of acquired characters. It must be stated, however, that neither side of the contention can be proven correct — it is a matter of the weighing of evidence and the acceptance of the more probable view. So far as we know there is no way in which the characters of the differentiated somatic cells can be impressed upon the germ cells, though the possibility of such an effect must be acknowledged. Up to the present time there is no known case of the inheritance of a mutilation, no proven instance of the transmission of the results of training, no authentic case of the passing on of a pathological condition acquired during the life of the individual. At the same time it is possible to explain all cases of apparent transmission of an acquired character on the basis of the development of characters carried in the germ plasm.

Assuming, then, that inheritance is purely concerned with the characters of the germ plasm, and that a character present in one generation can only reappear by inheritance in a succeeding generation if it be in some manner incorporated in the germ plasm or be a result of matter or force contained therein, we may question how germ plasm may be made to vary or to acquire new characters. One internal cause is "amphimixis," as Weissmann calls it — the mixture of germ plasm

from two strains nearly or distantly related, the latter being termed hybridisation. In either case there is the possibility of a new character being developed by some new combination of the material different from any combination previously existing. However, in the absence of sexual fertilisation new characters appear, and the fact that they seem independent of external causes suggests the possibility in this case also of recombination and new combinations within the same mass of germ plasm. A third possibility is the direct action of external stimuli upon germ plasm. This has been proven possible by the use of chemical agents, and if it could be shown that somatic cells might by developing such agents affect the germ cells this would strengthen greatly the cause of those who believe in the inheritance of acquired characters.

Confining our discussion now to germinal variation, we find it exhibited in two forms with respect to the mean. If in the study of a large number of specimens all belonging to the same type we find them groping about the mean of the type in a manner conforming to the law of chance, we suspect what is termed "fluctuating variation," and this judgment is confirmed if, by breeding those not agreeing with the mean, they show in every case a tendency to revert to it. From such breeding no new type could be produced. If, however, the examination of such a collection shows certain specimens differing from their fellows qualitatively, and this qualitative difference reappears in succeeding generations, or if they differ quantitatively and in breeding their progeny group itself about a new mean which remains constant, we have what is termed "mu-

tation," and these mutants are really new types. The magnitude of the difference is not essential. According to De Vries this is the only manner in which new species are known to originate. The test comes entirely in breeding.

Up to this point in our discussion, though we have referred in a certain way to sexual reproduction and to hybridisation, we have been viewing the animal nevertheless as an individual. We have touched upon the nature of the organism, made up as it is of impressionable protoplasm, the character of its development and the phenomenon of differentiation, the way in which its characteristics are passed on to its offspring through chromatin division, the extent — or rather the lack of extent — to which it may transmit acquired characters, the degree to which the characters of its germ plasm may be modified, and the possible manner in which it may vary from the mean of the type to which it belongs. Now let us change our point of view and consider the animal as a hybrid — as a combination of characters derived from two unlike parents. Since variation is a universal phenomenon this will be true in the case of every animal resulting from sexual reproduction. We shall have to investigate the characters presented by each of the two parents and examine those of the new individual with respect to the manner and degree in which the parental characters reappear. We will find frequently that any given character has been inherited intact, as for example in the case of eye-colour, which in the young is like that of one parent or the other, not half-way between.

When we come to investigate inheritance in the light

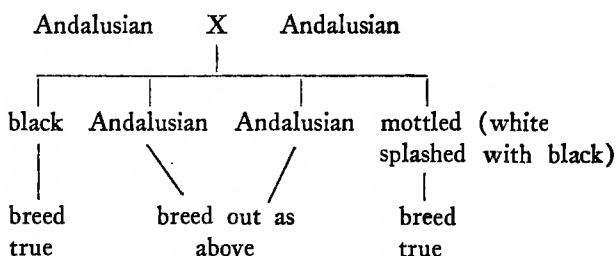
of our present knowledge we find that in every case these hereditary characters seem to act as units, which, however intimately they may be associated together in the individual, are segregated in the process of maturation of the sex-cell, those which remain being able to enter into new combinations when, by union of this sex-cell with that from another individual, a third individual is produced. In those combinations where the inheritance is alike from each parent we get a character reappearing intact — the offspring is homozygous with respect to this character. When the inheritance is unlike the offspring is said to be heterozygous with respect to the particular character. Here the character from one parent may dominate over the character from the other, which is then said to be recessive. Or, finally, a character from either may become evident only in case a factor is furnished from the other which brings it out. These principles of independent unit characters, segregation, and dominance are all involved in Mendel's law, the result of the work of an Austrian monk during the middle of the last century. This law as well as the factor hypothesis is theoretical, but these theories furnish us with a logical explanation of the facts of inheritance as we know them to-day.

Let us examine the various forms of inheritance in the light of the theories just stated, taking first alternative inheritance. Mendel used peas. If he crossed a tall pea with a dwarf one all the seeds developed tall peas. If he crossed a dwarf pea with a dwarf one all the seeds developed dwarf peas. But if he crossed a tall pea with a dwarf, he secured a hybrid which was tall, because, as he found out from his experiments,

tallness was dominant over shortness. If we represent the tall pea by T and the dwarf by D, individuals produced in the first experiment can be represented by TT, those in the second by DD, those in the third by TD. Now if tall peas are bred together we can never get anything but TT, if dwarf nothing but DD, but if the hybrids are crossed we can get three types — TT, TD, and DD, and these will be in the proportion of 1 : 2 : 1; but since tallness (T) dominates they will appear as if 3 tall and 1 dwarf. TT will breed true, DD will do likewise, and the hybrids will continue to develop both types in the above proportion. A pure tall (T) bred with a hybrid (TD) will produce half tall and half hybrid, but all will appear tall; a pure dwarf (D) with a hybrid (TD), half dwarf which are pure and half hybrid which appear tall. If we examine the inheritance of dark and blue eyes among persons we find the presence of pigment and absence of pigment acting as unit characters, the former being dominant over the latter. Many examples of such characters are now known among animals, examples being hornlessness dominant over horns in cattle, red eyes over white in the pomace fly, the trotting habit over the pacing in horses, short hair over angora hair in guinea-pigs, crested over plain head in canaries, rumplessness over long tails in poultry, polydactylism over normal number of toes in several species of animals, etc.

It is evident that alternative inheritance involves the complete dominance of one character over another, a phenomenon which has been found to occur in the case of very diverse characters and in very different organ-

isms. In many other cases, however, the characters have seemed to blend, and this has up to the present time been considered due to characters failing to act as units but being susceptible of fusion and that in varying proportions. Nevertheless, very recent work seems to indicate that this phenomenon may be due in certain cases to imperfect dominance of characters, which are after all unit characters. An example is the Andalusian fowl, of a bluish colour.



To produce 100 per cent. of Andalusians we must breed Black x Mottled.

In other cases Davenport explains the blending of characters or the absence of dominance as due to variations in the potency of that upon which the character depends. He instances:

Two rumpless cocks of the same blood, bred with the same array of hens.

Rumplessness is due to an inhibitor of tail development.

Neither cock has a trace of a tail.

In one the development of the tail in a cross with a tailed hen is not interfered with at all, and even with rumpless hens the character is not well developed.

In the other rumplessness develops in 47 per cent. of all

crosses with tailed hens, and crosses with rumpless hens may produce a family in which all possess the lack of tail.

That is, if a determiner lack potency the character may be incompletely developed, may be retarded in its development, or may fail to manifest itself at all. Still another way in which blended inheritance may be explained is by assuming that the intermediate gradations are due to the action of several determiners each conveying the same kind of character but in different degrees and each acting as a unit. Without entering into the details of experimentation, it may be said that carefully conducted experiments seem to show the probability also of the last of these explanations being true in certain cases, and one or the other of them applicable in every case of blended inheritance.

The explanation of particulate inheritance involves what may be termed the factor hypothesis, which assumes the possibility of combinations of determiners. According to this hypothesis one determiner added to another may cause a character to appear, may inhibit its appearance, may modify the degree of its development, or may modify its character. Bateson found two strains of white sweet peas, each breeding true, which, when crossed, gave only purple flowers; and this is explained as due to the presence of complementary factors in the presence of which purple colour was developed. Experiments upon the inheritance of colour in guinea-pigs and mice, by Castle, Cuenot, and Miss Durham, have pointed clearly to the existence of pattern factors, intensifying factors, and diluting factors.

When one considers that a higher animal presents a complex aggregate of highly varied characters, and that these may be segregated in reproduction and a different aggregation be evolved in the next generation, and then reflects upon the possibilities presented by this factor hypothesis, it is seen that we are but on the threshold of our investigations in this field.

Applying what has been said to man, the practical conclusions which I desire to draw are as follows: An individual's personality is due, so far as its inherited nature is concerned, to the presence of characters derived in equal degree from both parents; some of these are dominant and potent and cause the individual to resemble strikingly one parent or the other; others may be dominant, but through imperfect dominance, lack of potency, or the existence of graded determiners the characters associated with them may appear to be a blending of characters derived from the two parents, or resemblances to one or the other be exhibited only in moderate degree; others still are recessive and exhibit no evidence of their presence; the individual may present a character present in neither parent but traceable to a more remote ancestor, having been recessive or having not been developed owing to the presence or absence of some factor in combination. Our knowledge at present is insufficient to do more than establish the truth of the axiom "blood will tell," to enable us to say that a man's essential nature is determined by his inheritance. It is conceivable that the time may come when we can analyse the individual in terms of his ancestry and predict with certainty the nature of his offspring.

At this point the question naturally arises, if inheritance concern merely the germ plasm and acquired characters are not transmitted, how has man been able to improve old types of cultivated animals and plants and to establish new? Several methods have been followed. One is to place the stock under the most favourable conditions and then select for breeding the best developed of the individuals produced. This is a process of selection, based upon the belief that acquired characters are inherited, and the results are uncertain. If the characters are purely acquired ones they may reappear in succeeding generations with an equally favourable environment, but will disappear if this is not maintained. If they persist in the absence of such environment the assumption is that a favourable strain has been selected which is breeding true or that it is a case of mutation. Another method is to select for breeding those individuals that make the best showing under ordinary or even adverse conditions and then by crossing these to secure stock of an improved quality. This method comes more nearly securing stock which is desirable by nature and therefore capable of transmitting its desirable qualities to the offspring. A third method consists in the search for mutations and their continued preservation. A fourth involves the isolation of pure lines by breeding from a single individual which is self-fertilised or asexually produced, and thus a superior strain is evolved, but this is evidently of limited application with respect to animals. A fifth is the method of chance hybridisation and the selection from among the hybrids of desirable types. And last is the application of a knowledge of segregation and

dominance to the production of new types starting from parents having the desired qualities. Recessives will always breed true; homozygous dominants will also do so; but heterozygous dominants will only yield in time a practically pure strain by the constant elimination of recessives as they appear.

So in many ways man has attacked the problem of developing new and improved types, and it will be noticed that permanent progress in this direction depends on the extent to which he has succeeded in influencing the germ plasm. But he does not stop at the securing of better blood and superior seeds. By care and cultivation he endeavours also to develop the finest individuals; his soil is thoroughly tilled, well fertilised, and if possible well watered, his animals are well reared, well fed, and properly protected from the inclemencies of the weather. This is logical since as we have seen an individual is the product of both inheritance and environment—the former determining his nature and the *possibilities* of his normal development, the latter the extent to which these possibilities are realised and the assumption of acquired characters which may favour or hinder their action. Thus are applied both the principles of eugenics, which has to do with the inheritance, and of euthenics, which has to do with the environment; the individual is the product of neither alone, but of both.

Before applying what we have said more specifically to man, it should be noted that psychical traits seem to act in inheritance just as do physical characters. Both mental ability and mental defectiveness seem to be heritable, and while skill in action is a result of culti-

vation and an acquired character there seems to be the inheritance of such ability as makes it possible for one individual to develop a much greater degree of excellence in performance than another with the same amount of practice, and also makes it possible for one to attain a degree of proficiency which is impossible to the other under any conditions whatever. On the other hand, the possession of an inherited character which would favour a certain kind of ability may not be suspected till some condition in the environment brings it out — it might never be suspected at all. As Conklin has said, "In all organisms, the potentialities of development are much greater than the actualities."

In applying to man the facts and theories which have been presented we must recognise certain qualifying factors. In the first place, man has come to be exempt to a degree from the operation of natural selection, since he can apply artificial means to the compensation of physical deficiencies. The law of the survival of the fittest does not apply to him, for the same reason. Man to a considerable degree lives in an artificial environment, and can determine for himself many of the conditions of existence and of development. Nurture is transmitted from parent to offspring as it can not be in animals, and moreover every person has it within his power to profit by the culture which is the common property of the race. Thus mankind modifies to a slight degree its inheritance, but could modify it much more by the application of the principles of eugenics; it modifies greatly its environment, but will no doubt modify it still more, and so the principles of eugenics, with the limitations im-

posed by the non-inheritance of acquired characters, should be better understood and more constantly applied.

The application of the laboratory method is impossible in the study of heredity in man, so we must fall back upon the evidence derived from genealogical records and from statistics furnished by institutions such as insane asylums, prisons, sanitariums, and homes of various kinds. A classical example of the inheritance of undesirable characters is the history of a family known as the "Jukes," the descendants of a backwoodsman, "a good-natured, lazy sot, without doubt of defective mentality." The histories of over a thousand of the family are more or less well known. About one-third died in infancy; an equal number were professional paupers; 440 were wrecked physically by disease which their own wickedness bred; more than half of the women were grossly immoral; 130 were convicted criminals; 60 were habitual thieves; and 7 were murderers. In contrast to this is the record of the descendants of Jonathan Edwards, of whom 1,394 were identified in 1900. Of these 13 were college presidents, 65 college professors, 60 physicians; 100 and more clergymen, missionaries and theologians; 75 officers in the army and navy, 60 authors and writers, 100 lawyers, 30 judges, and 80 public officials, one of whom was vice-president of the United States, and three United States senators. Davenport gives facts indicating clearly that the characters which stamp this inheritance were not developed in Jonathan Edwards but are traceable to his grandmother, Elizabeth Tuttle.

A convincing case of the inheritance of a specific character, feeble-mindedness, is that of the "Kallikak family," the history of which dates back to the time of the Revolution. In the case of the "Jukes" family the descendants of one of the daughters of the original ancestor have been prevailingly criminal, of a second sexually immoral, of a third paupers.

In the histories just given the evidence for the inheritance of ability and a high degree of morality on the one hand, and defective mentality and criminality on the other, seems indisputable. But for myself I can not help thinking that environment played its part. We are told that not one of the "Jukes" had a common school education, while 295 of the descendants of Jonathan Edwards were college graduates. This may have been due to temperamental and therefore hereditary differences in the children of successive generations in the two families, but it is at least conceivable that home influence and other factors in the environment had much to do with this result. Both home training and opportunity militated against the chance of a child of one family securing an education, while strongly urging that of the other to do so. One was nurtured in an atmosphere of ignorance and criminality, and the other in that of enlightenment and morality. And yet it must be confessed that little success has attended experiments in the placing of children of criminal parentage in industrious and respectable families.

An interesting fact derived from the study of human heredity, and referred to in the preceding paragraph, is that moral traits, as well as physical and

mental, seem to be heritable. (See pages 79, 112, 123, 200, 330, *et seq.*)

Davenport, in his book on Heredity and Eugenics, has attempted to bring together all that is known about the inheritance of family traits in man, and enumerates a large number as clearly heritable. Among these are many physical characters, as eye-colour, hair-colour, hair-form, skin-colour, stature, body weight, etc.; a number of mental traits, including possession of marked ability on the one hand and feeble-mindedness, epilepsy, certain forms of insanity and criminality on the other; musical, literary, and artistic ability, mathematical aptitude, and inventive genius, as well as temperament and moral sense.

Several agencies are at work gathering data and we may expect a considerable increase in our knowledge of heritable traits in the near future. The most notable of these is the Eugenics Record Office at Cold Spring Harbor, Long Island.

The ultimate aim of both eugenics and euthenics is the improvement of the race. The former seeks to secure this by bettering the conditions of the individual and, by education, cultivating his capacities to the utmost; the latter by securing a better heritage from generation to generation. The two, however, must work together. Any hereditary characteristic is the result of a reaction between the germ plasm and its environment — is the expression in the soma of a tendency or potentiality transmitted through the germ. The biologist who would minimise the value of environmental influences and educational effort, is as much at fault as the sociologist who fails to grasp the

vital importance of the germ plasm. As Walter has well said, "Without euthenic opportunity the best of heritages would never fully come to its own. Without the eugenic foundation the best opportunity fails of accomplishment."

The programme of eugenics, then, consists in securing better conditions of living, and this opens a wide field when one considers that these conditions concern not only the needs of the individual but the common needs of society. The details of this programme are to a considerable degree a matter of common knowledge, and time does not allow of their individual consideration here.

One cacothenic factor which is deserving of especial mention is alcoholism, and this may be accepted as typical of the action of several poisons, particularly narcotics, to the influence of which the body may be subjected. If alcohol is taken into the body in small amounts and at infrequent intervals it may be burned up without affecting even the somatic cells except perhaps those with which it comes directly in contact. If taken in larger amounts or at more frequent intervals so that it is absorbed and circulated more intimately among the tissues it may modify the soma permanently and thus acquired characters be developed. And the amount taken may be so great or the influence of the drug be constant for so long a time that even the germ plasm may be affected, perhaps not the chromatin but at least the cytoplasm of the germ cells. As a result when such a germ cell develops the effect is seen in the failure of the body cells to differentiate normally, and various types of defectiveness are exhibited. It seems

clear from the study of inheritance in families that in this way defects which would otherwise be recessive are allowed to become apparent.

In a manner similar to that just described, the effects of disease may be transmitted, even though the disease itself is not. This might be urged as the inheritance of an acquired character, but I should say that that does not follow, since there is no evidence that the chromatin, the substance which carries the hereditary properties, has been affected, and since the effect referred to in the absence of a continuance of the stimulus is not transmitted as a heritable character to succeeding generations. At all events the effect has been exerted directly and not through the soma.

The science of eugenics is in its infancy, and much on the programme it presents is tentative. The first step in this programme is the accumulation of facts and since the method used must be largely statistical all reliable data bearing on human heredity are important, whether they pertain to traits that have in the past been transmitted in a given family or whether they pertain to the appearance of traits in the coming generation which are shared in common with the parents. A second step consists in the restriction of the undesirable elements in the heritage by closer control of immigration, more discriminating marriage laws, the segregation of defectives, and sterilisation of confirmed criminals, idiots, and imbeciles. There is little question of the desirability of all of these measures but the last, but there are two sides to this question. The procedure must be looked upon as experimental, and since eight states have sterilisation laws on their

statute books it would seem the part of wisdom to await the results of these experiments before beginning others. A third step in the programme is the conservation of desirable germ plasm by preventing the loss of manhood due to war, by enlarging individual opportunity, and educating the public to the desirability of more care in the selection of mates. Increased individual opportunity may be secured by subsidising the fit, by a higher scale of wages, by a decrease in the cost of living, and by the removal of social hindrances to marriage such as the increasing demands of professional and business life. The methods of procedure last outlined again carry us over into the field of eugenics, which we have seen from so many points of view lying close to that of eugenics.

Many additional suggestions have been offered, some of them most unpractical and sure to bring the eugenic movement into ridicule and disrepute. But if the measures referred to above, which are those most advocated, are pushed, a wide field for fruitful endeavour is presented which will not be exhausted for many years to come.

In conclusion, let me urge you to make personal application of that which has been given. You are an individual with a multitude of hereditary characters, in part evident and known to yourself if not to others, in part not evident and quite unsuspected even by yourself, with potentialities certainly far beyond those you have so far realised, with abilities awaiting a favourable opportunity for their development. You have a body through which these characters, these potentialities, must be expressed, and by means of which these abilities may be developed.

If you would be successful study your own character, seek out these potentialities, test your abilities, that you may learn of those you possess and develop them. Study your ancestry, for thereby you may discover possibilities of which you are ignorant. If you would be wise conserve your body so that it may be an effective instrument in the realisation of these possibilities. Seek to avoid the development of unfavourable acquired characters and cultivate those which are favourable. Be temperate in all things.

You have a social duty to perform. Unless prevented by the performance of some other equally important obligation or by some other social service, and if you be fit, you owe it to society to marry and bring up children. But do not marry or produce children without first considering carefully your own fitness to do so and also the fitness of your mate. If you have an honourable and a favourable heritage, see to it that you transmit it unsullied to children who will honour you. If your heritage is defective make the most of it yourself, but consider carefully before you pass it on to others.

I have presented to you a subject which should be read and studied by every educated man and woman. It is a field as yet little developed, but which even now offers knowledge of incalculable value.

Some of you have received one talent, some two talents, some five. Do not bury even the one in the earth of unfavourable acquirement. By careful husbandry of your resources add to them and pass on a worthwhile inheritance to future generations.

III

EUGENICS FROM THE POINT OF VIEW OF THE PHYSICIAN

VICTOR C. VAUGHAN

THE word, eugenics, meaning the generation or reproduction of the good and referring to the human race, was coined by the late Sir Francis Galton, who defined the term as follows: "Eugenics is the science which deals with all influences that improve the inborn qualities of a race; also with those that develop them to the utmost advantage." It will be seen from this definition that Galton intended that this new science should not be restricted to a study of heredity and its effects upon race development, but should include congenital and postnatal influences as well. In one of his essays, Galton speaks of heredity and environment as follows: "Nature is all that a man brings with himself into the world; nurture is every influence from without that affects him after his birth. The distinction is clear; the one produces the infant such as it actually is, including its latent faculties of growth, of body and mind; the other affords the environment amid which the growth takes place, by which natural tendencies may be strengthened or thwarted, or wholly new ones implanted. Neither of the terms implies any theory; natural gifts may or may not be hereditary; nurture does not especially consist of food, clothing, education,

or tradition, but it includes all these and similar influences whether known or unknown. When nature and nurture compete for supremacy on equal terms in the sense to be explained, the former proves the stronger. It is needless to insist that neither is self-sufficient; the highest natural endowments may be starved by defective nurture, while no carefulness of nurture can overcome the evil tendencies of an intrinsically bad physique, weak brain, or brutal disposition."

It is along these broad lines marked off by the founder of this new science that I propose to discuss certain questions bearing on the development of the human race. This is not to be a strictly scientific lecture on disputed, or as yet unsolved, problems in heredity. It is a fact of universal observation applied to all living things from the lowest to the highest that like begets like, that man reaps what he sows, and that in man himself racial and family traits are repeated in generation after generation. It is equally true that in all the wide world of animate things there are no two individuals exactly identical. Similarity and variation are equally in evidence wherever we turn. Without stability in reproduction life would be chaos; without variation in generation development would be impossible. The child may resemble father or mother or both, but cannot be an exact reproduction of either. Most likely the child resembles its father in some respects and its mother in others, but in all instances it differs from both, and these differences may be marked. The ancestors of the child are those of the father plus those of the mother, and it not infrequently happens

that some dominant trait in the ancestral line back of father or mother and not recognisable in them becomes the most potent factor for good or ill in moulding the child. This is an old observation as is shown from the following quotation from Bacon's "Advancement of Learning": "It happeneth sometimes that the grandchild or other descendant resembleth the ancestor more than the son." The physical, mental and moral attributes of the child are determined not wholly by father and mother, but in part by the ancestry that lies further back. In order to forecast the destiny of a child it is necessary to know not only the father and the mother, but the stock from which each has come. The eugenic records recite many illustrations of this, and I will briefly abstract one reported by Davenport. The father is an educated, respected physician, the mother is a talented woman, who has shown no other defect than migraine and chorea in girlhood. The children are two boys, one normal, truthful and lovable; the other a liar and a thief. The mother's father, whom the children never saw or even heard of, was a drunkard, and was once involved in a murder.

Galton calculated with a fair degree of probability that the average child receives one-fourth of its peculiarities or characteristics from each parent, or one-half from the two, but half of these may be intensified by like qualities or neutralised by contradictory inheritances. The greatest possible contribution made by each of the grandparents would be one-eighth, but a part of this is included in that which comes through the parents, and the remainder, be it for good or ill, comes from the endless line of the ancestral dead. This

would be true if all traits were alike transmissible, but as we shall see, certain ones are dominant and tend to appear, while others are recessive and tend to lie hidden. It is also a fact that traits do not necessarily reappear in succeeding generations in exactly the same form. This is true of both good and bad inheritances.

Family traits have been observed and commented on from remote times, but the first scientific, experimental study of their transmission was undertaken by an Austrian monk, Mendel by name, about the middle of the last century. This man had the true scientific spirit, experimenting intelligently, observing accurately and recording truthfully. His work was published, but did not attract attention until nearly forty years later when, quite ignorant of his work, De Vries, Correns, Tschermak and others undertook like investigations and obtained similar results. Then, some one found the forgotten work of Mendel and those who had unconsciously followed him were big enough to give him credit, and now we speak of the Mendelian law of inheritance. Mendel experimented with peas which he grew in the garden of the monastery. He carefully crossed those of contrasting characteristics; those with long stems with short; those with green unripe pods with those of yellow pods; those with inflated pods with those of constricted pods; those with round seeds with those of angular seeds; those with yellow seed leaves with those of green leaves; those with white seeds with those that yield grey, etc. Mendel found that when he crossed contrasting peas, in the first generation one or the other character prevailed practically to the exclusion of the

other. For instance when dwarfs were crossed with tall stemmed peas, all were tall.

The characteristic which prevails in crossing pure stocks is known as the *dominant* character, while that which apparently disappears is known as the *recessive* character. In the cross between short and long stemmed varieties of peas tallness is dominant and shortness recessive. When one parent is of pure blue-eyed stock and the other of pure brown-eyed stock, all the children will have brown eyes. In this case brown is dominant and blue recessive. But the dominant character does not permanently prevail, nor is the recessive permanently lost. The tall peas produced by a cross between tall and short when bred among themselves produce three tall to one short. This means that in the first generation from the cross-breeds seventy-five per cent. have the dominant character, and twenty-five per cent. the recessive character. Furthermore, when the recessives of this generation are interbred all the offspring have the recessive character and continue this and this only so long as the interbreeding continues. On the other hand, when the dominants are inter-bred, some produce only dominants, others produce three dominants to one recessive, and this continues. It will then be seen that in crossing the two pure stocks the dominant and recessive characters are in reality distributed in the offspring as follows: One-fourth inherit the dominant character only and transmit this to their offspring; one-fourth are in reality recessives, and when interbred reproduce this character only; one-half are in fact cross-breeds and show both dominants and recessives in their

offspring with the former numerically greater than the latter.

The followers of Mendel hold that the individual is made up of unit characters each of which is transmitted through inheritance quite independently of the others. These unit characters do not themselves exist in the reproductive cells, but the germ plasm contains a "determiner" which leads to the development of its own special unit character. The nature of the determiner is not understood. Some think that it is a ferment, but this assumption has no support in fact, and it is more probable that the determiner is a small atomic group in the very large and complex molecule present in the reproductive cell. When a certain unit character does not develop it is assumed that the determiner is absent, but that this cannot always be true is shown by the fact that the unit character which may not be in evidence in either parent manifests itself in their offspring.¹ It is supposed that brown eyes are due to a determiner or enzyme which produces a coloured pigment, while blue eyes are due to the absence of the enzyme. The unit characters do not blend, and the individual is a mosaic of the units transmitted from his ancestors. In this way it happens that the individual may strikingly resemble one parent in some respects and the other in different peculiarities, or he may display in marked degree the peculiarities of one of his four grand-parents, or he may inherit some striking trait passed down from a more remote ancestor. When one parent has a given

¹ A "unit character" that appears in the children but not in either parent is really, by hypothesis, due to the lack of a determiner. Thus "blue eyes" is due to the absence of the determiner for brown iris pigmentation.

characteristic while the other does not have it, the child gets it from only one side, and in the second generation half the children may possess it, and the other half be without it. In this way a child may resemble one of its grand-parents in this one particular more than either parent. A characteristic which comes from only one parent is known as simplex, while one coming from both parents is said to be duplex. When a given recessive character is not found in either parent it will be absent from all the offspring. When both parents have blue eyes, which are due to the absence of brown pigment, all the children have blue eyes. When both parents have blond hair all the children will be light haired. If both parents have brown eyes all the children may have brown eyes or one-fourth of them may have blue, the latter inheriting from a grand-parent. When one parent has brown and the other blue eyes either all the children will have brown eyes or half will have blue. Davenport says: "If both parents are simplex in a character, so that they produce an equal number of germ cells with and without the character, then in a large number of offspring, one in four will have the character duplex; two in four simplex, and one in four will not have the character at all (nulliplex). This gives in the offspring of such a pair the famous three to one ratio, sometimes called the "Mendelian ratio." [See also Webber, pp. 149-150, Elwood, pp. 223-224.]

It will be seen from what has been said that heredity consists in the transmission of unit characters or their determiners; that some of these are dominant while others are recessive; that they do not blend one with the other, but form mosaics; that the unit may be simplex,

duplex or absent (nulliplex). Students of heredity are busy trying to determine what are unit characters, and whether or not like laws control the transmission of all of them. Among the physical characteristics best studied are colour of eyes, hair and skin, stature and body weight. The two last mentioned seem to involve two or more units. In stature, length of limbs, body and neck and head may vary quite independently; besides stature depends upon age and is influenced somewhat by occupation. Davenport makes the following statements concerning the inheritance of stature: "The first general law is that in case the four grandparents are very unlike, the adult children will vary greatly in stature, whereas, when the grandparental statures are closely alike those of the children will be also. . . . The second general law is that when both parents are tall all of the children tend to be tall; but, on the contrary, if both parents are short some of the children will be short, and some tall, in ratios varying from 1:1 to 2:1. If all the grand-parents are short then there tend to be twice as many short children as tall; but if one grandparent on each side be tall there will tend to an equality of short and tall children."

Body weight is dependent upon several factors, but it is well known that both spareness and rotundity, especially in adult life, are often notable family traits.

Temperament, fluency in speech and readiness in composition, manual dexterity, memory, imagination and other physical and mental characteristics show unusual development in certain families, and Galton has collected much interesting and instructive data in his book

on "Hereditary Genius." Making all due allowance for family influence in securing positions of honour and trust, it must be admitted that mental ability repeats itself in certain families, while it is unknown in others.

The most distressing matter with which eugenists are at present concerned is the inheritance of defective mentality. The prevalence of feeble-mindedness in this country is becoming alarming, and demands the attention of all who are interested in the future of the race; and who is not? Without being an alarmist or a pessimist, I wish to say that the American people is threatened with the spread of mental and moral degeneracy through the multiplication of the unfit. I am not alarmed about this because I believe steps will be taken to check this threatening disaster. However, it is the plain duty of those who perceive this danger to call attention to it and suggest, if possible, how it may be averted. Davenport and Weeks after making a scientific study of epilepsy and feeble-mindedness in New Jersey make the following statement: "If our data should hold for strains with epileptic members we could conclude that if no change in mating and fecundity occur, the number of epileptics and feeble-minded in the State of New Jersey will be relatively double what it is now in 1940, and relatively four times as common in 1970. Thus, if the present proportion is 1 to 500 it would be 1 to 125 in 1970."

Rosanoff and Orr have arrived at the following conclusions from a study of Heredity and Insanity: "The neuropathic constitution is transmitted from generation to generation in the manner of a trait which is, in the Mendelian sense, recessive to the normal condition.

Rules of theoretical expectation are accordingly as follows:

a. Both parents being neuropathic all children will be neuropathic.

b. One parent being normal, but with the neuropathic taint from one grand-parent, and the other parent being neuropathic, half the children will be neuropathic and half will be normal, but with the capability of transmitting the neuropathic make-up to their progeny.

c. One parent being normal and of pure normal ancestry, and the other parent being neuropathic, all the children will be normal, but capable of transmitting the neuropathic make-up to their progeny.

d. Both parents being normal, but each with the neuropathic taint from one grand-parent, one-fourth the children will be normal and not capable of transmitting the neuropathic make-up to their progeny, one-half will be normal, but capable of transmitting the neuropathic make-up, and the remaining fourth will be neuropathic.

e. Both parents being normal, one of pure normal ancestry and the other with a pure neuropathic taint from one grand-parent, all the children will be normal, half of them will be capable, and half not capable of transmitting the neuropathic make-up to their progeny.

f. Both parents being normal and of pure normal ancestry, all the children will be normal and not capable of transmitting the neuropathic make-up to their progeny."

There has been some divergence of opinion concerning the inheritance of epilepsy as a unit character. If tradition and history are true, some great men — Napoleon and Cæsar for instance — were subject to mild

forms of epilepsy, but the evidence is not unquestionable. Epilepsy may follow a blow, in other words it may be traumatic, but a like traumatism is followed by epilepsy in only a few, and it is thought by some that these have an inherited taint. It is certainly true that when both parents are epileptic all the children are defective mentally. Epilepsy and feeble-mindedness seem to be interchangeable in inheritance, and that epileptics are not fit parents has been abundantly demonstrated.

All agree that certain forms of insanity are transmissible, and so far as such inheritance has been studied it seems to follow the Mendelian law. When both parents are insane, none of the children remain normal; when one parent is normal but of insane stock and the other insane, half the children may become insane; when both parents are normal, but of insane stock, about one-fourth the children become insane. Certain forms of insanity, such as those due to trauma or to certain poisons and diseases are not transmissible. This leaves a third class in which the insanity is due to alcohol, syphilis and other poisons, concerning the transmissibility of which there is still diversity of opinion. However, parenthood from this class is not desirable, and is not likely to improve the race.

In discussing questions of heredity it is well to distinguish between poverty and pauperism. A man's poverty may be greatly to his credit. Carlyle writes: "I have a sacred pride in my peasant father. Let me write my books as he built his houses, and walk as blamelessly through this shadow world." Speaking further of his parents he said: "They had to scramble,

scuffle for their clothes and food. They knit, they thatched for hire, above all, they hunted. My father had tried all these things from boyhood. The mother had not always meal to make them porridge. Once the meal which had perhaps been long scarce, and certainly for some time wanting, arrived at last late at night. The mother proceeded at once to make cakes of it, and had no fuel but straw that she tore from the beds to do it with." The man of good family may decline to enrich himself by means which his less scrupulous and baseborn neighbour does not hesitate to employ. But the shiftless, ne'er-do-well pauper is usually the descendant of poor stock. We cannot call shiftlessness a unit character, but as a rule the individual who exhibits it has no reason for pride in ancestry, nor much hope in posterity. It usually means lack of energy and indifference to those incentives that move the normal man to strive for the necessity and comforts of life. Even the diseases which afflict the pauper and tend to keep him in that state are often the results and not the causes of his condition.

Whether alcoholism and similar addictions are due to inherited weakness or to acquired depravity is still a question on which there are differences of opinion. There are families of drunkards, and drunkards are much more common in families characterised by mental defects than in normal ones. Feeble-mindedness, epilepsy, insanity, sexual obliquity, criminality and alcoholism are often found on the same genealogical tree, and seem to thrive under like conditions. There is much evidence to support the claim that alcoholism engrafted on good stock leads to deterioration, while on bad stock

it increases the defects. Davenport and Weeks in their studies of epilepsy state: "We see, accordingly, a constant excess beyond expectation of epileptic and feeble-minded offspring from alcoholic parents. Insofar our results support the view that alcoholism, to a certain extent, is a cause of defect; that 10 to 20 per cent. more children in any fraternity are defective than would be were it not for alcohol. However, a word of caution must be added. It is not improbable that some of the alcoholics are actually feeble-minded, and any such would tend to increase the average of defective offspring because of their inherent defective germ cells, and quite apart from any poisoning effect on the germ cells of alcohol." Evidently we have to leave it undetermined for the present whether alcoholism is begotten of, or begets, feeble-mindedness. It is sure that they belong to the same breed.

The relation of heredity to crime is a complicated problem, and one which remains without satisfactory solution. All authorities on the subject say that some are criminals by descent, but to what extent the criminal tendency is inherited through the germinal plasma, and how much it owes to environment it is difficult to say. That we have in our population the greatest proportion of criminals of any civilised nation has been asserted by some of our greatest jurists. Wier says that in this country "250,000 persons whom the law never touches are engaged in the systematic pursuit of crime — There are four and one-half times as many murders for every million of our population to-day as there were twenty years ago. . . . Ten thousand persons are murdered in this country every year, and of the murderers only two

in every hundred are punished." The causes of this sad condition are variously interpreted. No less an authority than President Taft thinks it in part at least due to defective administration of the criminal law. He says: "It is not too much to say that the administration of criminal law in this country is a disgrace to our civilisation, and that the prevalence of crime and fraud, which is here greatly in excess of that in European countries is due largely to the failure of the law and its administrators to bring criminals to justice." Then, there is the question of what is crime. The poor mother who steals a loaf of bread to feed her hungry children or picks up lumps of coal fallen from an over-loaded car to keep them from freezing is a thief, and is quite sure to be condemned as such while the stock manipulator who steals a railroad is a great financier. A former Earl of Shaftesbury said that the dangerous classes are not the people, but the rich who do no good with their money. To my mind the man who sells watered, or fictitious stock, is as truly a thief as the one who steals a purse, and the student of the relation between crime and heredity must include the former as well as the latter in his studies before he can show that inheritance is more potent than environment in the development of the criminal. However, I am ready to admit that the feeble-minded are often petty criminals, but these are not able to distinguish between right and wrong. The juvenile courts are acquainted with cases of this kind, and Coulter of New York speaks of them as follows: "When a case of out and out mental deficiency is discovered in a juvenile delinquent there is no place where that child can receive proper

treatment. The result is that such of those children as are committed to ordinary institutions are being made into habitual criminals and paupers; each, too, an agent for the reproduction of his kind in later years."

In addition to the unit characters, certain anatomical peculiarities are transmitted and mark certain families. This is strikingly illustrated in supernumerary digits, cleft palate, etc., but is also true of less obvious structures. Inborn deaf-mutism is well known, and intermarriage among these defectives should not be encouraged. President Jordan states that the Cretins of Aosta have been eliminated within less than thirty years by segregation of the sexes, and thus preventing their reproduction. Certain diseases, as hemophilia, Friedrich's ataxia, and Huntington's chorea are hereditary beyond any doubt. There are families of so-called bleeders — people in whom hemorrhage is frequent and difficult to control. There is an especially interesting fact about the inheritance of this defect. It manifests itself usually only in the males. The daughters, as a rule, do not show it, but transmit it to their sons.

One of the most striking and convincing family histories illustrating both the ill and the good that may come through heredity is detailed by Goddard in his story of the Kallikak family. The name is for obvious reasons not the true one. At the beginning of the Revolutionary War a young man, known in the history as Martin Kallikak, had a son by a nameless, feeble-minded girl, from whom there have descended in the direct line four hundred and eighty individuals. One hundred and forty-three of these are known to have been feeble-minded, and only forty-six are known to

have been normal. The rest are unknown or doubtful. Thirty-six have been illegitimate; thirty-three, sexually immoral, mostly prostitutes; twenty-four, alcoholic; three epileptic; eighty-two had died in infancy; three were criminal, and eight kept houses of ill-fame. After the war, Martin Kallikak married a woman of good stock. From this union has come in direct line four hundred and ninety-six, among whom only two were alcoholic, and one known to be sexually immoral. "The legitimate children of Martin have been doctors, lawyers, judges, educators, traders, landholders, in short, respectable citizens, men and women prominent in every phase of social life." These two families have lived on the same soil, in the same atmosphere, and in short, under the same general environment, yet the bar sinister has marked every generation of one and has been unknown in the other.

Davenport, Goddard and others have collected similar histories, and while no other is quite so striking as that of the Kallikak family, all point to the fact that the sins of the fathers extend even to the third and fourth generation. The evidence that there is seed so bad that good cannot come from it is conclusive.

The Jukes family of New York State, so thoroughly studied by Dugdale, was for five generations made up almost exclusively of criminals, prostitutes, drunkards and paupers, and in the course of seventy-five years cost the State more than a million and a quarter of dollars. The family in Indiana, known as "the tribe of Ishmael," has in five generations produced one thousand seven hundred and fifty individuals. Of the females more than thirteen per cent. were known to be

prostitutes and most of the men were alcoholics and criminals, the charges against them running along the scale from petty larceny to murder. In one county in Michigan there is a group of families more or less closely connected by intermarriage, only five per cent. of the individuals being normal. Miss McKinnie, who has been conducting a survey for the State Board of Health, says that the total cost of maintenance for defective members of these families in State institutions has been over \$86,000, exclusive of the capital invested in buildings and of local or State aid given in their homes. From these families there are now thirty-eight in the home for the feeble-minded at Lapeer, one hundred and thirteen feeble-minded at large, and twenty-two known prostitutes. Miss McKinnie estimates that there are not less than nine thousand feeble-minded at large in the State, and these are multiplying their kind. From this class come the Giteaus, Czolgoz and Schranks.

The eugenist is trying to accomplish two things both of which are essential to the future welfare of the race. One of these is to prevent the multiplication of the bad stock, and the other is to encourage the replenishment of the good. It will be seen that the science of eugenics has its negative and its positive work.

Negative eugenics can succeed only by the help of legal enactments. There must be laws preventing the marriage and reproduction of the unfit. The first thing to be done in carrying out a programme of this kind is to determine who is unfit. At present surveys are being made in certain localities by men and women trained at the institution for the study of experimental evolution

located at Cold Spring Harbor, Long Island, N. Y. The Director of this Institution is Dr. Chas. B. Davenport, and the work is supported in part at least by the Carnegie Institution at Washington. The men and women trained by Dr. Davenport are excellently prepared for this work. It is customary to begin such a survey by going to a State institution for the feeble-minded and then visiting the families represented by the inmates. Field workers study the genealogy of the feeble-minded. Davenport suggests that the school teachers of the country should make a general eugenic survey, but I doubt the feasibility of this proposal.

I wish to suggest a plan which I believe to be preferable to that suggested by Davenport. The enumeration and location of the feeble-minded and of others, whose reproduction are to be discouraged, should be a part of a broad, scientific scheme for the uplift of the race. In every densely populated county of this country there should be a health officer or commissioner, an efficient medical man with the training which would fit him for his work. He should give his entire time and energy to the preservation of the health of all within his jurisdiction. He should study and authoritatively advise in matters of water supply, sewage, the general sanitation of city, village and individual homes; should prevent threatened epidemics and suppress existing ones; supervise disinfection and vaccination; make a complete sanitary survey of every part of his jurisdiction twice or oftener every year; find every case of tuberculosis, infantile paralysis, typhoid fever or other infectious diseases, see that the individual is properly cared for and the spread of the infection prevented;

locate every case of inheritable defect whether it be physical, mental or moral, and be ready to advise as to the measures necessary to prevent the reproduction of the unfit; study the conditions under which wayward children are being reared; ascertain whether their homes are unfit places for them or they are unfit for their homes, whether their defects are due to nature or to nurture, to heredity or environment. Within a few years such an officer with trained assistants would become acquainted with the virtues and vices of every family within his jurisdiction. Degenerative tendencies would be detected in their early development, and with the aid of a wise judge much could be done to stifle crime before it is born. Crime is a disease due to heredity or environment, or both, and at present we permit it to breed and come to maturity in our midst. It will not grow less so long as this continues. Its breeding places should be located and disinfected. Children even in this day and right here among us are growing up in an environment which precludes their development into good citizens. This is true of some who have come from good stock, and doubly true of those in whom the tendency to evil is inborn.

No child should be born into this world save from good stock. However, "good stock" needs some explanation. It does not mean riches. This is certain. It is true that in common parlance we have unduly magnified wealth. We say that such a young man or woman has a great inheritance, and by this we mean riches, but this is not the meaning given the term "good inheritance" by the eugenicist. One could hardly think of the rugged and masterly intellect of Thomas Carlyle

or Abraham Lincoln coming from a line of wealthy ancestors. By "good stock" the eugenist means one relatively free from undesirable unit characters, and the most important of these are alcoholism, feeble-mindedness, epilepsy, insanity, pauperism and criminality. All of these classes should be excluded from the list of those to whom is granted the privilege of exercising the highest, holiest, most important function of the race — parenthood. From what I have already said it is evident that in order to boast of good stock it is necessary to have the history of at least three successive generations. Among these there should be none of the defective unit characters mentioned above. The marked development of any one of them is likely to reproduce itself in some of the descendants. Among your ancestors, there may be those who were poor; those who won no official position; those who made no great contributions to literature, science, or art, in short all may have been very ordinary people, but so long as all were sober, sane and honest, you have a goodly inheritance. This is a family record of which but few kings can boast, and its possession should be highly prized by those fortunate enough to rightfully claim it, and it remains for such to so live as to honour the worthy dead, to whose lineage they belong. As Macaulay said: "As we would have our descendants judge us, so ought we to judge our fathers."

While I have been talking about heredity I dare say that the young among my auditors have been busy thinking of their ancestors, and wondering what manner of people they were. I ask you to turn about and face the other direction. Let the dead past rest with those who

have made us what we are, and with whom we are bound by the unbreakable thread of the continuity of the race. The fact that we are here in this great institution of learning, striving to prepare ourselves for the duties that lie before us is sufficient proof that however the good and the bad may have mingled in our creation, the dominant unit characters in our lineage must have been good. Let us now look into the future — say fifty years from now. Then young men and women will be wondering what kind of ancestors they had, and this means that they will be thinking of you and me. The past has made us; for the future we are responsible. When we were conceived in our mothers' wombs the gates of ancestral gifts were closed.

The warp and woof of the character-habiliments that we are wearing have been spun for the most part at least by those who are now mouldering in graves. We are to prepare the character raiment for those who are to fill our places. Let us do this work skilfully, intelligently and honestly.

The generations of the future will have cause to bless or curse us according to the lives we live. By the process of evolution, man has grown to a degree of intelligence which makes him a co-worker with the creator, and the future of the race is largely within man's power to make or to mar, to illumine or to darken, to fill with the joy of life or with the regret of having been born. It may be that years from now some young man, having apparently a brilliant future before him, will be stricken with insanity because one of you, his ancestor, got drunk and acquired syphilis. As potent as it is, heredity is not the only factor in determining the future of the race.

A man may come from the best stock imaginable, and still he may do that which unfits him for parenthood. As advancement in each generation is possible, so relapses may occur. *Decensus averno facile est.* As I have already stated, it is still a question as to the exact relation between alcoholism and heredity. Some hold that alcoholism is a result of bad inheritance, while others are quite sure that it leads directly in the offspring to feeble-mindedness and insanity. Be this as it may, it is an undesirable unit character and unfits for parenthood.

There are some diseases that are so destructive to man's physical and mental development that nature makes an attempt to prevent their transmission. This is true of the venereal diseases. In the male, gonorrhoea renders a considerable per cent. of its victims sterile, the exact percentage varying with the virulence of the infecting agent. In woman this disease accomplishes the same end in a much more serious manner, and a large per cent. of the women who go to the operating table for pelvic troubles owe their sad condition to this disease. Blindness in the newly born is quite without exception due to this disease. Syphilitic parents seldom bring healthy children into the world, and practically all perish either in utero or in early childhood. Knowing these things it must be evident that the venereal diseases unfit one for parenthood. A considerable per cent.—not all—of both these diseases is curable, and when properly treated this bar to parenthood may be removed. But even when this can be secured, it means much and prolonged distress of body and

mind, and in this connection we may repeat and extend our quotation from the wise old Latin poet :

The gates of hell are open night and day;
Smooth the descent and easy is the way;
But to return and view the cheerful skies —
In this the task and mighty labour lies.

It should be evident from what I have said that alcoholism, epilepsy, the venereal diseases, feeble-mindedness, insanity and criminality should be absolute bars to parenthood.

There are other matters which may be discussed in this connection. It is generally believed that when father and mother are much alike the children are prone to be peculiar at least. This is due to the fact that the unit characters become duplex and exaggerated. If all the unit characters were desirable this would not be objectionable; indeed it would be highly beneficial for good unit characters to come from both sides and be duplex, but since no one is free from some undesirable unit character this is likely to become duplex and to appear in the child in an exaggerated form. This is the ground for the ban placed on the marriage of first cousins. If each possess only favourable unit characters there can be no objection to such marriages. Some excellent families have come from first cousins, but this is more likely due to the fact that the dominant characters in each have come from other than the common stock. On the whole, in-breeding is to be condemned, the evidence against it being so plainly seen in certain isolated localities. There are many factors which tend to in-breed-

ing. One is geographical isolation, such as islands and mountain ranges. Davenport has pointed out the ill effects of close intermarriage on the islands and peninsulas of our Atlantic coast. Other factors are social status, language and religion. One of the causes of the marked degeneracy among the Southern Italians is the fact that they are broken up into small communities and have been isolated for so long that the dialect of one group is not intelligible to that of a relatively nearby community. Those in each group intermarry and have done so for so long that the undesirable unit characters have been exaggerated to such an extent as to render the people decidedly inferior. Even among the foreigners who have come to this country language remains for one generation at least, as a barrier to wide acquaintance and favours in-breeding. Religion has had a similar effect.

While in-breeding is to be condemned it is equally certain that interracial marriages produce an undesirable progeny. The Eurasians of India, the mulattos of our own country, and the mixed races of South America and neighbouring islands are unanswerable arguments against race mixtures. The bad of each side becomes dominant, and the mongrel whether man or beast, is no credit to the pure blood on either side of the house.

Every normal individual from untainted stock should prepare for the responsibility of parenthood. Some are influenced by the hope of personal immortality; some may be led to right living by the rewards promised in another and better world; some may be restrained from evil by the fear of eternal punishment, but all should know that each generation begets the succeeding one,

and that like breeds like with the possibility of betterment on the one hand and of deterioration on the other. Our children and their descendants through generations to come, with modifications coming in in each generation will bear at least some of our characteristics. If we are healthy they are likely to be. If we are strong mentally and morally they will receive through inheritance more or less of our strength. If we meet every problem in life courageously and honestly they will find it all the easier to perform their duties with credit to themselves and with benefit to others of the same generation. Every deviation from the path of rectitude made by us will make it more difficult for them to keep to the straight road. This is the teaching of science, and is it not the highest conceivable incentive to make ourselves strong in every proper direction? The young man or woman who neglects his or her opportunities of self-betterment is doing an injury not only to self but to those whose thread of life is for the time in their keeping. Moreover, our influence on the future is to have its effects not only on our direct line, but upon those about us, and through them upon their descendants. No man can live to himself alone, but each is a part of the whole and the perfection of the whole depends upon its parts.

I am compelled at this point to make a direct appeal to the young women. Do not marry a man of bad habits with the hope of reforming him. Even if you succeed in this attempt, which most frequently fails, you will likely bear children who will repeat the faults of their father. Don't marry any man unless you wish your children to be like him. In fact women have been

and are now, quite unconsciously for the most part, the stronger eugenic power as between the sexes. Learned statisticians have shown that the average length of life is greater among married men than among unmarried men, and this has been taken as proof that the conjugal state favours longevity. This conclusion is not, however, the only one which may be drawn from the facts. While some splendid men remain single from choice, many remain in this state because no woman will marry them. It follows therefore that the average married man not only enjoys greater longevity, but is superior in every particular to the average unmarried man, because in the latter group are included all those who on account of obvious defects are excluded from the former group. The same holds true between married and unmarried women, and for like reason. There is one striking and regrettable way in which man often fails to show himself a eugenicist. This I regard as so important and vital to racial welfare that I must be permitted to go into some detail. The female moron, especially when of high grade and in early womanhood, is often very attractive. Her face has the doll-like loveliness so fatal to the susceptible man. In form and carriage she is to her admirer a goddess. He interprets her weak-mindedness as maidenly innocence, and he says to himself, sometimes to others, "She is the daintiest, sweetest, most innocent creature in the world. She never suspects anything wrong and she loves me so dearly that she would do anything I might ask. She is my darling little girl." It is true she is a "little girl," and she will never be anything more. Mentally she never grows beyond "sweet sixteen." She is an ani-

mated doll and, like her prototype, the bloom on her cheek will soon fade and her gay raiment will soon become tawdry. Many a young man of good stock and of excellent personality falls a victim to the bewitching moron girl. Her vine-like clinging love will entwine her admirer or any other post within her reach.

I was once enjoying an after dinner talk with a great man, one who has achieved more than a national reputation, and I led him to speak of himself and of his family. With much animation and with pardonable pride he spoke of his ancestry, but as he turned from the past to the future his face grew sad and his voice tremulous as he said: "But when a man has sons some one of them is pretty sure to marry a silly girl and then the family name will go to pot."

Social duty has compelled me more than once to witness the marriage of such a butterfly with a high grade man, and when the beautiful ceremony reached the words: "If any man can show just cause why they may not lawfully be joined together," etc., I have been compelled to suppress the desire to cry out against the outrage.

Every family physician of years of experience and observation knows how disastrously such marriages end. Let me briefly sketch the outlines of one instance. Some forty years ago a brilliant young man of high character met, admired and wed such a girl as I am describing. Both were poor, but this was an advantage rather than otherwise. For his profession he was unusually equipped both by nature and by nurture. He had bright dreams and the ability to weave the gossamer of their structure into real fibre. But there was one

picture in his dreams as he stood at the altar with his fair bride, which no power on earth could ever bring to realisation. He dreamed of winning a competency, if not a fortune, of becoming a leader among men, of professional fame, of rendering the highest and best service to his fellow man, and the central figure in all these visions of the future was a wife of whom he should always be proud, who should stand by his side, at all times his equal and who should bear to him strong, manly sons and fair, intelligent daughters. He won more than competency; there was no official position within the gift of his state which was not within his reach; his professional service was sought by both rich and the poor; from the one he demanded and received liberal compensation, to the other he gave time and labour cheerfully and gratuitously. Living, he was honoured and beloved, now dead, his memory is held in the highest esteem. All these victories he won and at the same time he carried a heavy load. His wife never grew mentally. He bought and read the choicest books. She dusted and arranged them on the shelves, but of their contents she was as ignorant as she was of Hebrew. Intelligent men and women sat at their table, but their conversation was beyond her comprehension. His most intimate friend never heard from him a word indicating that he recognised any inequality between himself and his wife. To her he was only kind, gentle and considerate, but when he entered his own home smiles fled from his face, and his voice lost much of its charm. To this union there came three sons. The eldest even with the help of private tutors was never able to finish the high school course. In early man-

hood he married a fellow moron, and they are now multiplying their kind on a farm given by the father. The second is more intelligent; after a university career, broken by drunken sprees, he managed to secure a degree, and now occupies his father's office, but not his position in life. The third is hardly able to take care of himself.

I speak with some feeling on this subject, because I have known former students of mine to tie these millstones about their necks, and then try to keep on the surface of the sea of life. After vain struggles most of them sink out of sight. To the young men of my audience I wish to say, "Shun the attractive, frivolous girl." She is found in nearly every community. The object of the eugenist is not to multiply her kind, but to exterminate her.

There is another anti-eugenic condition in this country which calls for plain talk. I refer to class distinction as a bar to proper marriage. But says one, we have no social classes in this country. This is not true. Class distinctions exist in this and all other countries, and probably always will. To a certain extent they may be desirable, but the one to which I especially refer at this time is on a wrong basis. That basis is money. The daughters of the rich are for the most part deserving of sympathy. They live so luxuriously that no self-respecting American young man can afford to approach one of them with matrimonial intentions. His total income would not suffice to keep her in pin money, and many such women have to find some man who is willing to live a parasitic life, feeding on her wealth, and the American young man worthy of parenthood is, as a rule,

not willing to do this. He has not been bred to that kind of life, and the poor girl often is compelled to find a fool for a husband, be he a foreign one with title, or a native without, and in either case she seems doomed to become the mother of fools. The daily chronicles of current events supply numerous illustrations and there is no need for me to say more on this point, only to add that in my opinion this defect is not confined to the daughters of the ultra-rich. Those of many of the moderately well-to-do live so expensively, idly and vainly that they repel rather than attract proper suitors. A young man once confided to a friend, saying: "Were it not for one thing I would long ago have declared myself the slave of a certain young lady (well known to both), but when I see that bird of paradise on her hat I hesitate. Think of its cost, but more deterrent than the cost is the fact that I cannot help thinking that one who plumes herself with so characteristic an ensign of savagery must still contain within herself a large remnant of the barbarian."

It may be asked what kind of development best fits for parenthood. It is man's nervous system which has made him the lord of creation. In size, in muscular strength, in fleetness, in physical endurance he is surpassed by many animals. Even in his special senses his development is not equal to that of many animals. The vision of certain birds of prey penetrates distances through which man could distinguish nothing. His sense of smell is imperfect compared with that of his dog. Man differs from, and is superior to, all other animals in the evolution of his nervous system, the most perfect product of nature's biological laboratory. The

Superman, when he is established on earth, will not radically differ from his progenitors in size, height, muscularity or blood supply, but his nervous system will be more highly developed. There are those who seem to think that race regeneration is to be found in athletic training. This is fallacious and even dangerous. Overdevelopment of muscle makes in the long run for weakness rather than strength. Man needs a strong frame, properly developed muscles and good circulatory apparatus, because all these are essential to his nervous system. Even in his barbaric state, man's superiority was determined not by brawn, but by brain. This has held through every stage of his development, and will continue. It has always been and always will be, intelligence against brute force. Had it not been for superior intellect the genus homo would long ago have disappeared in the contest with fellow creatures, extremes of temperature and scarcity of food. Man comes into the world the most helpless of all animals, and with one or two exceptions he has the lowest birth rate, and yet he has gained dominion over the earth and all that is therein. With growth in intelligence the birth rate falls, but this is quite compensated for by a lessened death rate and increased longevity. The eugenicist is concerned with quality more than quantity, and he agrees with Emerson who said: "Make your nation consist of knaves and it is but the case of any other vermin — the more the worse;" or as Ruskin wrote: "It is a matter of no final concern to any parent whether he shall have two children or four; but matter of quite final concern whether those he has shall, or shall not, deserve to be hanged."

What is the measure by which we may decide that one man is better than another? In what direction and for what purpose shall we strive for the betterment of the race? In improving the breeds of the lower animals, some one trait is selected and developed. In this way, draft, carriage and racehorses have been developed. The varieties of dogs evolved from the original are as numerous as the fancy of man has dictated. Some fruits are developed because of size, others for flavour, and still others for form. What traits in man are to be evolved through the efforts of the eugenicist? There is no call for a race of athletes because, as we have seen, over-development of muscle is to be avoided. Some say, let us develop for intellect and leave all other traits out of consideration, but many men of intellect prostitute their gift to the basest purposes. It is said that the most liberally rewarded legal talent in this country is that which is employed in keeping high-grade thieves, generally known as great financiers, out of prison.

The Superman is to be healthy and intellectual, but the standard of measurement will be neither of these. It will be civic worth, and what do we mean by this? We mean the service he renders his fellowman. An efficient man is one who supports himself and contributes something to the welfare of the race. To beget and rear children worthy of him is to make such a contribution. "Good breeding" as used by the eugenicist does not mean polish of manner, ability to behave properly on all occasions, to dress in fashion, to use French phrases, etc., as desirable as these qualifications may be. It implies the desire, energy and ability to render social

service, to make the world better, be it ever so little, to make his life a blessing to others.

The eugenist does not propose that marriage selections shall be determined by statute, but it does propose to so educate the young that selections shall be made on more rational grounds than is now too frequently the case. The eugenist does not aim to abolish or degrade the institution of marriage, but does aim to inculcate the idea that marriage is the highest, holiest of institutions, so holy that he who dishonours it shall be counted worse than an infidel. It does not teach, as Plato did, that no mother shall know or nurse her child, but that every mother shall love and nurse her child. It is no free love scheme, for that would lead to physical, mental and moral debasement. It does not propose to abolish the family, but to bind its members together by stronger ties of a more rational love.

The eugenist will endeavour to induce the State to aid in the evolution of the Superman by the following methods: By restricting the reproduction of the obviously undesirable. It is even now a crime by statute in this State for an individual of one sex to infect one of the other with a venereal disease, whether the relation between the two be that of husband and wife or not. However, such a statute is at present without other than educational value. Inasmuch as the prevention of crime is much wiser than permitting and then punishing it, the State will go further and demand that marriage be permitted only to those free from these diseases. Even this may at first have but little more than educational value, but it will soon be recognised as a wise provision, and honourable people will

voluntarily comply with it, and failure to comply with it will be regarded as a social disgrace. The declaration of Dean Summer of Chicago that no marriage will be solemnised in his church unless both parties show by medical certification that they are fit for parenthood will accomplish quite as much as legal enactment. It will come to pass that every wise man and woman will undergo a medical examination once or oftener each year, to ascertain whether they are sound or not. Others will follow this wise example and preventive medicine will prove the greatest factor in the evolution of the Superman. In working out this problem the State must supply expert medical advice, because this opportunity must be open to poor and rich alike, and the medical man must be the servant of the State for it will be for the public good that such a service will be rendered. No two consecutive examinations will be made by the same physician, and the record of each examination will be an official document. An abnormal condition overlooked through carelessness or lack of skill by one medical officer will be detected in subsequent examinations. In this way the effects of both heredity and environment will be detected early, and if they be bad the proper remedy will be at hand.

The State will not permit the reproduction of the weak-minded, the insane, the alcoholic and the criminal, and will deny parenthood to those suffering from diseases which cripple offspring. This prohibition will be enforced by segregation or by sterilization, or by both. Already the sterilization of certain classes under certain restrictions has been legalised in eight States, and in one the operation has been performed upon

more than seven hundred individuals. The State has the right to protect its honest citizens against those that are evil, and no one can deny that the multiplication of the classes mentioned above and specified by the law is an evil. In order to secure protection against the evil doer, the State may and does often take his life; may it not therefore render him incompetent to reproduce his kind? Besides, it is the opinion of competent men who have observed the effects of this operation that it has a salutary effect upon the individual thus treated. For many reasons segregation is better than sterilisation, the chief objection being the greater cost, but the cost of this method, as great as it would be, is much less than we now bear from the unrestricted multiplication of these classes, the members of which occupy our courts, necessitate a large police expenditure, and fill our reformatories, asylums and penal institutions. At present the bad multiplies and the good is contaminated. Crime breeds in our midst. We enact and attempt to enforce laws against it while we permit it to grow and scatter its seeds year by year. Here in this university town, there are children doomed by birth and environment to be prostitutes and criminals. The atmosphere in which they live is as fatal to good citizenship as the temperature of the north pole would be to the growth of tropical fruits. Specific details are not suitable to this address, but can be supplied if desired. The State is doing something in the way of encouraging positive eugenics, and it will do more when our legislators more fully comprehend the higher purposes of government. The public school, imperfect as it is, is a potent factor in race betterment.

To its support all must contribute, each in proportion to his means. The rich help to educate the poor and the childless bear a small part in preparing the coming generation for its duties. The public school must and will be improved. More attention will be given to the sanitation of school houses and medical and dental inspection of the children constitutes an important move in the right direction. Instruction in hygiene, including that of sex, will be of great benefit. Leibnitz said: "Permit me to direct the instruction of the children, and I will change the world in a hundred years." It seems to be conceded now that every grade of instruction from the primary through the university should be within the reach of the poorest, provided he has the ability to profit by it. This is true not only of basic and general instruction but of expert training as well. Less than fifty years ago it was still denied by many that the State should train farmers, engineers, lawyers, physicians, etc., but now it is generally admitted that the development of efficient men and women is not only a function of the State, but a profitable one. Vocational education must be extended and must have its roots in the primary and secondary schools. In these grades evidence of degenerative tendencies must be detected and the fit and unfit separated. It is worse than idle to keep the normal and abnormal in the same classes and try to force the latter to keep pace with the former. Beyond a certain point in intelligence the moron cannot go.

Sickness, especially infectious disease, imposes a heavy burden upon those who are parents, consequently preventive medicine is a potent factor in the nature and

nurture of generations. Even those of the best stock become less fit for parenthood when infected with tuberculosis, scarlet fever and sequelæ, poliomyelitis, etc. It may be that the defects induced by these diseases are not transmitted to their offspring, but that they do not contribute to improve parenthood must be admitted. More than two centuries ago Descartes said that the regeneration and development of man must come through preventive medicine, and the experiences of the generations that have come and gone since that time confirm his statement. The suppression of diseases, both those that are transmissible from parent to child and those which affect directly only one generation is a state problem, and must be solved by the State. I include here as diseases, not only the microbic infections, but feeble-mindedness, alcoholism, insanity, sexual perversion and criminality.

To deny the possibility of race betterment is the worst form of infidelity; it means to be without faith in self, in fellowmen and in the creator. To fail to work for it is to neglect the highest duty. Race betterment, which of course includes and depends upon self-betterment, should influence our daily lives, form a basis for our ethical judgments, determine our political activities, and be a strong motive in our religion.

IV

EUGENICS AS VIEWED BY THE PHYSIOLOGIST

PROFESSOR WILLIAM HENRY HOWELL

IN his essay upon Evolution and Ethics, Huxley calls our attention in his vigorous and attractive manner to the antagonism that exists between the inner factors tending toward the development of man's moral nature, and those processes in the outer world which impose upon him a struggle for existence. He designates the two modes of evolution as the ethical process and the cosmical process respectively, and he develops at length his belief that in their action upon man they work toward different ends. The conflict that he pictures is familiar to all of us for it is in fact nothing more than the ancient and unending strife between our animal instincts and our moral nature, the struggle between the old Adam and the new.

Nature deals with living things in a large handed extravagant fashion, and her methods are justified, if we may use such a term, by the conditions of the problem. There is nothing in this world of ours so irrepressible as life — it tends to multiply itself, at the expense of inorganic nature, with almost incredible rapidity. The tiny infusoria in a pool of water, the insects that inhabit the earth, the fish of the sea and the birds of the air, if they were provided with favourable conditions and were protected from enemies would, any of them, quickly possess the earth. They

are held in bounds by the cosmical process which so far as living forms are concerned consists essentially, in Galton's phrase, "in excessive production and wholesale destruction." Given the extraordinary fertility of living things a practical balance can be maintained only by the restraining influence of an equally generous mortality.

By means of the sifting process of selection Nature has been working upon animals for untold ages and has been creating those forms which are best fitted to meet the conditions as they exist. Man has been trained in this competitive struggle. He owes his supremacy as a race mainly to the greater development of his brain and the resulting increase in wisdom which has enabled him to overcome his enemies from without, whether environmental or animal. He has used the same powerful weapon in the struggle with his fellowman, first of all for the means of existence and later under civilised conditions for the means of enjoyment. But in man along with his increase in mental power there has been going on the development of a moral sense which finds itself out of harmony with Nature's principle of the survival of the fittest; which in place of self-assertion and self-aggrandisement teaches self-repression and self-sacrifice; which bids us to protect the weak and to succour the unfortunate; which sets up in fact an ideal of conduct toward our fellowman that is at variance with the lessons impressed upon us by the struggle for existence. This process of evolution of our moral nature has been in progress from the dawn of civilisation. In its full fruition it promises a time when the earth shall belong to the meek in heart rather than to the

strong and crafty. It is needless to say that we are not yet within measurable distance of this millennial state of existence, but it is equally certain that the aspirations of civilised humanity look in that direction, and when we compare our state with that of less civilised peoples or indeed with that of our remote ancestors we are justified in believing that some sensible progress has been made.

It is not necessary perhaps to enlarge further upon this point; I have made use of it simply to emphasise the fact that mankind has proposed to itself certain standards of conduct which are opposed to those that Nature would seem to teach us are necessary to our preservation. In this as in other matters man has not submitted passively, like the beasts of the field, to the order of Nature. By virtue of his intelligence he understands something of the methods of selection employed by Nature and he has applied his knowledge to protect himself from being an unwilling victim to their action. Whether or not he will be forever successful, who can tell? At this period in the evolution of our world man is the favoured form of animal life, but it may not always be so. In the procession of the great year, as Huxley expresses it, at some point in that cosmic cycle whose immense sweep we but dimly comprehend, there may come a downward trend, a tendency toward retrogressive changes in the physical surroundings for which man will be less fitted than some inferior forms of life, but in which he may save his race by his intelligent control of the forces and processes of nature. Already he has used his knowledge successfully to oppose those environmental conditions which

tend to limit his productivity. He not only prays that a higher power may deliver him from tempest and lightning, from pestilence and plague, from famine and sudden death, but he has exerted all of his knowledge to devise ways of delivering himself, and not without a large degree of success. It is stated that in the twelfth century the average expectation of life was but little over twenty years. Disease and famine and war cut down life at such a rate that the new-born child could hope to live for only two decades. In our own times the average expectation of life has been prolonged, in the most civilised communities, to forty-five or fifty years — and we know that if we choose at any time to make full and intelligent use of the knowledge even now at our command we can still further safeguard our lives against the destructive agencies that threaten us from all sides. Preventive medicine and all other humanitarian mechanisms are but expressions of the development of our moral nature, and it is safe to say that mankind will continue always to approve such tendencies and will strive to reach higher and higher planes of moral excellence, unless indeed some cataclysm of nature should reduce him again to a feral state and revive the old savage struggle for mere existence.

Knowledge or science has done more than simply to defend human life from the assaults of nature. By means of education and hygiene and all the other agencies of civilisation it has striven to improve the quality of the individual from a physical, mental and moral standpoint, to make him more fit to maintain his position as an independent unit in the competition of

life, and above all to make him more fit as a social unit in a race striving to realise the ideals set by our moral nature. To this work humanitarians of all kinds have devoted themselves with increasing enthusiasm and at no time in our history have their efforts been more intense and more wide-spread than at present. No one is justified in minimising the enormous influence for good, as we see the good, which may be exerted upon an individual by bringing him under favourable conditions of environment. The hope of humanity lies in this direction and we may not place any narrow limits upon the results that are to be expected.

But there is another consideration, another factor, which we may reasonably hope to use for the benefit of our race, as an accessory instrument to aid its development under the laws of the ethical process. The gardener, to use Huxley's metaphor, who is endeavouring to raise certain kinds of fruits or flowers in accordance with his ideals of utility or beauty, not only seeks to protect his plants from the competition of Nature's lusty weeds and to give them the best of soil and nourishment, but he strives also to select the best stock that is attainable for the purpose he has in view. Now in this garden of humanity which we hope to develop according to certain ideals presented to us by our ethical nature can we not also use this last method? Can we not to some extent choose between the good and the bad stock in humanity, and devise some method, humane in character, which shall favour the perpetuation of the good strains and the elimination of the bad? This as I understand it is the province of eugenics. The term is defined officially as "the study of agencies

under social control that may improve or impair the racial qualities of future generations either physically or mentally." This is a wide definition that may include efforts to improve mankind by modifications of his environment as well as by control of his productivity, but as specifically defined by Galton the objects of eugenics are twofold: To check the birth-rate of the unfit and to further the multiplication of the fit, the terms fit and unfit being used, it will be noted, not only in reference to the test of the cosmical process, but in relation also to our ideals of what is most worthy to survive as measured by our moral standards. The term eugenics is comparatively new but the idea conveyed by the term is no doubt very old. The modern conception of evolution in which so much stress is laid upon natural selection has served to bring the idea more prominently to the front in recent times. The successful results obtained in the breeding of animals and plants must have suggested to many minds the possibility of applying similar methods to the betterment of mankind. By judicious selection and mating the breeder is able to develop in animals or plants those characteristics of structure or function which seem to him desirable. As an abstract proposition there can be no doubt that results of the same character might be obtained in the human race, were it possible to try the experiment, and without doubt many sincere spirits have hoped that some procedure might be devised to realise the benefits promised by such methods. There is, however, a great difference between speculating about such matters and actually formulating or advocating specific regulations to carry them into effect.

It is interesting to find that the leading biologists in the preceding generation were not willing to admit the feasibility of plans suggested for this purpose. Huxley in the essay which I have been quoting does not hesitate to express his entire scepticism in regard to the practicability of such schemes — and indeed for two reasons. In the first place because “no mere human being will ever possess enough intelligence to select the fittest” and, as a sort of corollary to this general proposition, because all such efforts must result in a “weakening or destruction of the bonds which hold society together.” Perhaps in making this latter objection Huxley may have borne in mind the outcome of the legendary Spartan system of selection. If we may believe the accounts that have come down to us the authorities in that old Laconian city did attempt under the Lycurgean system to breed a race according to certain ideals of what they considered the best. The “points” that they wished to develop were beauty and strength of body and courage. They paid but little attention to the cultivation of the mind or the development of the moral nature, and we may imagine that had their experiment been permitted to go on longer than was the case it must inevitably have resulted in disaster. For even at their own game of war what would it have profited them to have bred a race of heroes and giants, if other nations more attentive to things of the mind had developed scholars able to understand and use the forces of nature. No mere human strength or courage can withstand the explosive force of gunpowder. Assuming that the accounts are correct we can understand that the Spartans

made an experiment upon themselves without sufficient warrant of knowledge. The question before our generation is whether our knowledge to-day places us in a better position to interfere wisely in the matter of human propagation.

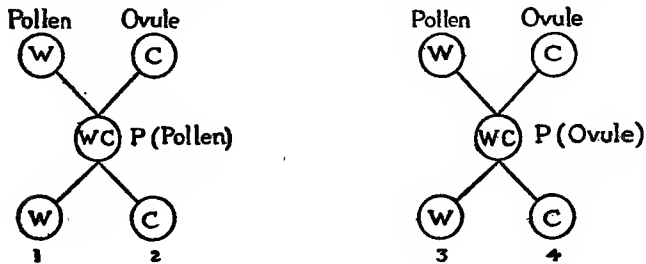
As far back as 1865 Galton advocated a moderate plan of eugenics which seemed to him to be justified by the knowledge and experience of the times, but he complains, in his autobiography, that he was not able to interest his contemporaries, not enough of them at least to give the movement any serious significance. At this present time the ideas that he then suggested have taken a strong hold upon the imagination of many persons, in the public at large as well as in scientific circles. There is in progress a world-wide discussion of the possibility of the practical application of eugenics, and we may anticipate that something will come out of this agitation, something that will influence directly the welfare of mankind, even the destinies of nations.

It is interesting to inquire what has caused this change in attitude. The answer is to be found I believe in the outcome of modern investigations upon heredity. It has always been known that the offspring inherits the physical peculiarities of the parents, and in late years Pearson has produced specific evidence to show that the same conclusion is justified in regard to the transmission of mental and moral characteristics, but the whole trend of recent biological investigation has served to magnify the importance of heredity in determining the fundamental characteristics of each individual. Two beliefs or generalisations which have

crystallised out of the work of many investigators are especially significant in this connection. One is the theory of the continuity of the germ-plasm, the other is the so-called Mendelian law or laws in regard to inheritance in cross-breeding. By germ-plasm is meant the special protoplasm or living matter of the germ-cells, and by the phrase continuity of the germ-plasm we mean to convey the belief that the material constituting the germ-cells in each individual is derived directly from the germ-plasm of the parents. The microscopic bit of material from which you or I developed was not constructed wholly anew in the bodies of our parents, it was a fragment — so to speak — of the material out of which their bodies were made, and so on down the ancestral tree. The germ-plasm passes direct from generation to generation, carrying with it inherent powers and characteristics of development. In each generation a part develops into the body of an individual and a part is reserved for transmission under favourable conditions, to succeeding generations. The germ-plasm of the human race is like a great river which has broken into countless streams. The water in each goes back to a common source and there has been no interruption of direct continuity. What each individual develops into therefore is largely determined by the characteristics of the particular strain to which he belongs. Our characteristics in fact are not personal property (Davenport) but are inherent in the stock. We possess them during our life-time, but if we have children we must pass them on, in part, for, figuratively speaking, they are entailed upon our descendants by nature and can not

be wholly alienated. The so-called law or laws of Mendel we owe to Gregor Mendel, Abbott of Brunn in Silesia who discovered them in the course of some experimental work upon the effects of cross-breeding in the common garden-pea. His results were published in 1865, but failed to attract the attention of the biologists of that time. The facts noted by him were re-discovered in 1900 by three independent investigators and have since occupied a large place in the work upon heredity. The fundamental points brought out in this work are that what we call simple characteristics are transmitted as units from parent to offspring, and that these units are conveyed by definite substances or structures in the germ-plasm. The substances, of whatever nature they may be, which serve as the carriers of the unit characters are designated usually as determiners or unit factors. In the germ-cells of the parents these unit factors are sorted out or segregated, and in the union of the male and female germ-cells which gives rise to a new individual the combination of the factors takes place in a predictable fashion, when large numbers are considered. These ideas may be illustrated by a simple case taken from the excellent little popular book on evolution by Goodrich. Two individuals of the snap-dragon family were crossed, one representing a constant race with crimson flowers and one a constant race with white flowers. The results of this cross were all hybrids with pink flowers. If now two of the hybrids were bred together the colour characteristic separated out in accordance with the law of Mendel — $\frac{1}{4}$ of the offspring bore true crimson flowers, $\frac{1}{4}$ pure white flowers

and $\frac{3}{4}$ showed the hybrid pink. The explanation of this proportion depends upon the fact that the colour factors were segregated in the germ-cells of the hybrids, as may be illustrated in the following diagram.



Possible combinations

Possible combinations	{	1 and 3 = pure white
		1 and 4 = hybrid WC or pink
		2 and 3 = hybrid WC or pink
		2 and 4 = pure crimson

Experiments in breeding as well as the experience obtained from observations upon natural propagation indicate that the two fundamental ideas of transmission of characteristics by unit factors and the segregation of these factors in the germ-cells are probably correct. The problem is not always, not usually in fact, so simple as in the illustration given above. Experience has shown that apparently simple characteristics, colour for example, may be dependent for transmission upon the combined effect of several unit factors, and it becomes necessary in such cases to unravel the separate influence of each factor by careful breeding experiments. The Mendelian law gives however a leading idea by means of which intelligent experimenta-

tion may be carried out upon a subject that otherwise would be enveloped in the obscurity of altogether mysterious processes. As an instance of the advantages which have followed upon the application of these laws I may refer briefly to the cases of so-called sex-limited inheritance. There are certain peculiarities or defects in inheritance which seem to be associated definitely with the property of sex. In mankind for instance we have under this head such conditions as colour blindness and hemophilia, which exhibit themselves usually only in the male. The condition known as hemophilia is characterised by a defective power of coagulation in the blood. It affects chiefly the male and it is a serious condition, since even slight injuries may result in death from hemorrhage. Clinical experience indicates that in those affected with this trouble something like 80 to 90 per cent. die from hemorrhage before reaching adult life. The condition is inherited, but the mode of transmission is criss-cross, or as it has been expressed, after the manner of the Knight's move in chess. The affected male transmits his defect to his grandsons through his daughters. His own sons or daughters do not exhibit the abnormality, but the daughters have or may have the factor upon which it depends present in latent or inhibited form in their germ plasm and thus transmit it to their sons. If we assume that the factor or defective factor responsible for this condition is associated with a structure known as the sex-chromosome in the germ-cells of the male it is possible, in accordance with the Mendelian law, to predict that neither the sons of a hemophilic man nor any of their descendants will show this abnormal char-

acteristic, while the daughters will be likely to transmit the defect to one-half of their sons, and, if they have daughters, to pass on to a certain proportion of them the possibility of further transmission. So far as the facts are known in regard to this dangerous inheritance they accord very well with this prediction. The understanding which we now possess of the mechanisms involved places it in our power, if we so desire, to eliminate this condition entirely by preventing the marriage of the daughters of a hemophilic man, or, more simply, by rendering the hemophilic male infertile by the process of so-called sterilization. Fortunately this particular condition is relatively rare so that the community as a whole need not perhaps take cognisance of it as a serious menace to the race. But for the individual who suffers from this defect or for the daughters of such an individual it is certainly a grave question whether or not they should permit themselves to bring children into this world handicapped by a functional disorder that subjects them to the constant danger of death by accident. I fancy that if these facts were placed before intelligent and not wholly egotistical individuals of this class, most of them would accept the logical conclusion and would refrain from marriage or from procreation, but upon the ignorant, or upon that group of intelligent persons who are prejudiced against scientific knowledge and believe that it is impious for man to attempt to deal rationally with the mysteries of life, evidence of this kind would probably have but little effect. If the condition were sufficiently widespread it would be necessary for the public to take some decisive action, and for its own pro-

tection as well as for the sake of the innocent sufferers to impose such legal restrictions as would prevent the propagation of the inheritance.

We have in this case an example of how the idea of eugenics may be applied for the benefit of the race — first, by the spread of knowledge and the force of persuasion, and second by definite legal restrictions in those conditions that are serious or widespread and for which the transmission by heredity has been definitely established.

It is evident also from this and many similar cases that we begin to understand something of the mechanism of heredity and that biological science has a means of investigation which promises much additional information. It is the realisation of this fact it seems to me which has given serious importance in our day to the idea of eugenics as a means of benefiting the race.

In former times each individual was considered more or less as a new creation, dependent for his future development mainly upon the nature of the environmental factors. We realise now that the fundamentals of his character and structures are contained potentially in the germ stock to which he belongs, and that a good stock may be expected to produce good fruit, a poor or defective stock evil fruit. To some persons this conception carries the depressing conviction that character is wholly predetermined and hence all efforts toward personal reform or improvement are useless. It seems to me that an attitude of this kind is altogether unwarranted. It is an example simply of a common tendency to build a complete logical argument upon incomplete premises; to treat half-truths as

though they were whole truths and thus develop a conclusion which may be entirely logical in form but altogether erroneous in fact. Even the wisest of us act or think sometimes after the manner of Farmer Oak's dog. This young animal you may remember was under instruction in the art of tending sheep. He had got so far in his education as to understand that a sheep was an object to chase, and one unfortunate night when the opportunity came to him he chased the flock so steadily and consistently that he drove them all to destruction over the edge of a cliff. There is no reason in this matter of personal development why our newer knowledge of the mechanism of heredity should lead any one to drive his conclusions to a similar disastrous end. The great fact that the germ-plasm has a certain definite structure peculiar to the strain need not make us overlook the equally important truth that the possibilities latent in that structure depend for their full development on the nature of the environmental conditions. We must recognise the fact that in the development of an individual organism heredity and environment both play important parts. In the words of a recent writer they stand to each other somewhat in the relation of an instrument and a player. What the instrument is by structure sets certain bounds to the character of the music it may be made to yield, but the actual result will vary within wide limits according to the proficiency and completeness of education of the player. The world has long recognised the importance of environmental influence upon the development of character and ability, and the idea of good and bad stocks instead of discouraging our efforts to control

these influences should rather stimulate us to renewed efforts, for it is evident that much that now lies dormant in the lower strata of humanity may be intrinsically good material that needs only a favourable environment to bring out its latent possibilities. Both good and bad stocks will yield better results under a favourable than under an unfavourable environment. That much we may assume as justified by all of our biological knowledge and by our experience. The new question or rather the old question in new form before us is in regard to the practicability of limiting the spread of the poor stock and favouring the preservation of the good, in accordance with the ideas of fitness and unfitness impressed upon us by our present state of moral development. The knowledge derived from experiments upon lower forms of life teaches us that results may be obtained along both of these lines, but at the same time we are warned by the results of such experiments that we must proceed with caution, since our knowledge of the factors concerned is obviously incomplete. Let us examine some of the concrete suggestions that have been made by the eugenicists. On the one side we have the proposal to prohibit the propagation of the obviously unfit. In this matter of so-called negative eugenics Galton outlined a programme which has served as the basis for whatever action has since been proposed. "Stern compulsion," said he, "ought to be exercised to prevent the free propagation of those who are seriously afflicted by lunacy, feeble-mindedness, habitual criminality and pauperism." We recognise without question that all of these conditions, in their extreme forms at least, are detrimental to the welfare

of the race. They are weeds in the garden of civilisation and we should be glad to have them eradicated by any means that does not offend our sense of humanity or endanger those "bonds of sympathy which hold society together." It would be a matter of great congratulation if medical science were able to deal with these conditions, but this hope is denied us. If we desire to move in the matter we must determine first whether these characteristics are the outcome of vicious environment or whether they are inherited traits. In the case of pauperism and habitual criminality we deal with conditions which are perhaps too vague and complex to be attributed at once without further proof to hereditary transmission, although the facts known to us certainly justify the suspicion that heredity constitutes an important factor in their production and dissemination. There is a considerable body of evidence which seems to show that these characteristics run strong in certain strains. The pedigrees of the infamous Juke family in New York State and of the Tribe of Ishmael in Kentucky have been worked out with care, and furnish capital examples of the way in which a bad stock spreads. The dismal frequency in these two strains of pauperism, criminality and general worthlessness will convince any one who consults the records that our race would have been saved much humiliation and expense had some high authority exercised a stern compulsion over Ada Juke and Ben Ishmael to prevent them from propagating their breeds. But this is a case of hind-sight. We will not get very far in the improvement of the race if it is necessary to prove first that the criminality or pauperism is habitual

in the strain. Some of our States have gone so far as to appoint commissions to whom authority is given to decide whether or not a criminal shows a record that puts him in the habitual class, and if so, at their discretion but under legal directions, to render him incapable of further propagation by the operation of vasectomy. This action, although it is held by some to be unconstitutional, is good so far as it goes, as a mode of punishment as well as a method of prevention, but I apprehend that it will not contribute greatly to the improvement of the race, if the commissioners exert their authority, as they should do, only after careful and conscientious inquiry. There is also the possibility that under our form of government the officials charged with this duty may not be selected always with reference to their knowledge and character, and may therefore in the end bring a good motive into public contempt. While public opinion may not wholly sanction surgical interference for purely eugenic purposes it will support, I am confident, the exercise of the authority of the government in restraining propagation among inmates of almshouses, reformatories and penal institutions. Among the inmates of our almshouses there may be some who have come to their sad estate by force of untoward circumstances alone, but for the most part we must believe that there is probably an underlying cause in a defective heredity, and on this suspicion alone the State should by careful supervision and discipline enforce a condition of celibacy among the inmates of such institutions. The past records of our almshouses are sufficient to give warrant for this action. Dr. Goddard has stated recently that a superintendent of one of the

best county almshouses told him that of 105 children born there in five years, 102 were feeble-minded.

What we most need in this matter of purifying the race of its worst stock is some means of recognising the hereditarily unfit before they have reached the age of puberty. In this direction much significant work has been done recently upon the condition known as feeble-mindedness. It must be borne in mind in the first place that there is a condition of defective mentality which is caused by accident or disease at birth, or subsequently, and which therefore is not indicative of a contaminated strain. There can be no doubt at all that the most normal minded and gifted person in the world may be converted into an imbecile by disease or accident involving certain areas of the brain. If we may trust our present knowledge of heredity the feeble-mindedness that arises in this way is not transmissible. But investigation and observation have demonstrated that there is a feeble-mindedness which is inherent in the strain and which is transmitted through the germ-plasm from generation to generation. Statistics collected by Dr. Davenport of the Laboratory for Experimental Evolution of the Carnegie Institution of Washington indicate that such strains may be traced back through many generations and at all times they have constituted a dependent and dangerous element in the community. When feeble-minded individuals of such strains intermarry their children are all defective, and if one of this sort mates with a normal person the defect is liable to appear in the progeny somewhat in the proportion indicated by the Mendelian law. The pity of it is that the opportunities for the propagation of such strains are

favoured rather than hindered by the state of our society. It is not very probable that those afflicted with insanity will marry with other insane persons, but unfortunately this is exactly what is liable to occur in the case of the feeble-minded. In this class of persons the sexual instincts exist in all their normal intensity — according to some observers indeed they are developed to an abnormal degree — and owing to their general state of irresponsibility, these instincts are followed or are likely to be followed with as much disregard of consequences as in the lower animals. An added danger is found in the fact that in women of this strain physical and temperamental attractiveness may accompany mental weakness with the result that they more readily fall victims to the passions of careless or reckless men. The humanitarian ideals of our times have led to the foundation of homes for these helpless people in which they are shielded from that competition with man and nature for which they are unfitted, and in which moreover every effort is made to improve and develop their mental capacity. The outcome of the unusual efforts made to educate these unfortunates has only served to emphasise the truth that environment alone can not accomplish everything. Whatever care may be put upon them the end result is a defective human being. They must remain in the institution throughout life or at least be kept under direct charge and supervision of some sort.

Dr. Goddard, the director of research in the Vineland Training School, New Jersey, has published recently a remarkable account of the pedigree of one of the inmates of that school. She is described under the

fictional name of Deborah Kallikak. The account of her family-tree is written in an interesting and convincing way, and should be read by every one who is at all concerned with this important sociological problem. Deborah herself belongs to the class of high-grade defectives designated as morons to distinguish them from the lower grades of imbeciles and idiots. According to the descriptions and photographs she is an attractive healthy looking girl, with some pleasing qualities and accomplishments, but with mental defects which make it impossible to expect a wholly normal intellectual development. Her pedigree is much too long to give in detail. The main facts in brief are as follows. The history begins with a certain individual designated as Martin Kallikak, Sr., who as a young man joined one of the military companies formed at the beginning of the American Revolution. While a member of this company he met at a tavern a feeble-minded girl by whom he had an illegitimate son. After the Revolutionary War Martin married a girl of good family by whom he had seven children. He thus became the progenitor of two lines of descendants. It has been possible to trace the history of these descendants to the present time. (See page 56.) On the side of the legal marriage they number 496 in direct descent. All of them were normal and indeed it would seem that they represented an unusually good stock. On the illegitimate side the son born by the feeble-minded woman was himself feeble-minded, and from him have come 480 descendants, 143 of whom were or are defectives. The graphic picture given by Dr. Goddard of the life histories of these individuals fills one with

regret and pity. Martin, Sr., probably gave but little thought to that escapade of the days of his youth, but we can imagine that if some higher power had given him prophetic vision to see that long and still growing line of degenerate sons and daughters the iron of remorse would have entered deep into his soul.

In this extraordinary history with its two sides of good and of evil we have a convincing demonstration that a defective mental condition is transmissible by heredity and is liable to intensification by the union of defective parents. It furnishes a striking confirmation on a large scale of the correctness of modern biological views in regard to the fundamental importance of the hereditary factor, and it calls our attention sharply to an evil that has been with us for centuries and which it is within our power to remove or reduce. If we were living strictly under the influence of the cosmical process defectives of this kind would no doubt be killed out in the struggle for existence, but under the conditions of civilisation it is necessary that they shall be protected and cared for. Does this obligation, imposed upon us by our moral sense, carry with it also free permission to increase and multiply? It is our duty as citizens to consider this problem. It is no small matter. Statistics inform us that there are in the United States some three hundred thousand feeble-minded persons and it is altogether probable that this is a minimal figure, for the field is a large one and it has not been examined completely. Moreover in the tide of immigrants pouring upon our shore recent investigations indicate that the proportion of feeble-minded individuals is extremely high; 6 to 7 per cent.

Heaven knows how many Kallikak families we are inoculating into our racial stock through this agency. It seems obvious that this problem is big enough and serious enough and concrete enough to demand immediate attention. It is perfectly clear also that if any action is taken it should be in the direction of mitigating the evil rather than merely concealing it. I recall that a few years ago on one of the small islands off the coast of Maine the population by much inbreeding, and probably because of an initial mixture of intrinsically poor stock, had reached such a condition of dependency and incapacity that the matter was forced upon the attention of the general public. The neighbouring townships were unwilling to charge themselves with the care of these people and therefore the authority of the State was invoked. The State acted, but its action, as I understand it, consisted in depopulating the island and scattering the inhabitants among adjoining communities. Adequate provision was made for compensation of property and the principles of justice were observed, but from a eugenic standpoint it was a very doubtful policy to follow. It was much like getting rid of a pest-house by scattering the patients through the community. With the history of the Kallikak family before us we may fear that the State has favoured the propagation of degeneracy among its inhabitants and has done evil where it intended to do good. What action should we take in such cases and indeed in regard to this whole matter of feeble-mindedness? Opinions differ upon this point, but it would seem to me that the right direction for us to follow is the plan advocated by Dr. Goddard.

Provision should be made for the examination of the mental condition of school-children, of inmates of institutions and of immigrants, and when congenital feeble-mindedness is clearly indicated the individual except in the last named group should be removed from the communal life and become a ward of the State. By colonisation or segregation into special institutions these unfortunate persons can be cared for much more satisfactorily as a rule than in their own homes, so far as their individual happiness and comfort are concerned, and under such conditions strict supervision may prevent successfully any further propagation. Dr. Goddard believes that in addition it may be possible to use the method of sterilization and thus save something in the way of constant care or supervision. But in regard to this feature it would seem desirable to go slowly and to try out the idea experimentally first in chosen cases before advocating its adoption as a general principle. The objections to such a plan as this are its expense on the one hand and on the other the appearance of inhumanity which may go with the forcible separation of families. As regards expense we deal with a practical question that must of course be considered with care. The matter is treated in some detail by Dr. Hart, Director of the Department of Child-Helping of the Russell Sage Foundation, in a most interesting pamphlet. He points out that the financial difficulty is not greater than in the case of the care of the insane, a problem which we have already faced and solved with a considerable degree of success. He states specifically a number of means which may be used to reduce the expense and

which if followed consistently must eventually result in the removal or significant reduction of this defect of feeble-mindedness among our people. It is not possible presumably to corral at once this whole scattered population of defectives, but if we recognise that this is the proper kind of remedy we can make a beginning, and proceed to reduce this evil as rapidly as our means permit. In the long run it may not be so costly as would seem at first sight, for Dr. Goddard makes a plausible economical argument in stating, and in giving figures to bear out his statement, that much of the pauperism, petty criminality, sexual degeneracy and prostitution which burden our communities have their source in the existence of feeble-mindedness. By directing our efforts toward the removal of this factor we shall be striking at the root of much of the social delinquency which we now attempt to correct by eleemosynary, reformatory and penal institutions of various kinds. There can be little doubt that when the people are fully informed in this matter pressure of public opinion will force the enactment of some kind of remedial legislation. There is reason to believe that in this direction the first principle of eugenics, namely the checking of the birth rate of the unfit, will soon be given a practical test on a large scale. As regards the second principle of eugenics, the use of agencies to promote the multiplication of the fit or of the most fit, it is evident that we are presented with a proposition in which speculations and aspirations may easily take the place of sober facts. The idea is interesting and promising, and ample discussion can do no harm; on the contrary it may do much good by emphasising

clearly the fact that each of us is in a measure responsible for the future characteristics of the race. The "after us the deluge" theory is not popular in our generation. We are much influenced, even the most inconspicuous of us, by the desire to be of service in the uplifting of mankind to higher levels, and the eugenic consideration when fully presented and understood will have its influence. One difficulty is that in this as in many other cases in which the facts of science touch the practical sides of life, there is great temptation for enthusiasts to make extravagant claims in the name of science that in the long run do harm to the cause by furnishing points for justifiable criticism. I for one would have little or no confidence in the judgment of any man, scientific or unscientific, who became very specific in saying thou shalt or thou shalt not in the matter of mating among normal people. Like Mr. Huxley I am not willing to believe that any man has wisdom enough to give such advice freely. Moreover while every one may be supposed to take some pride in his own kith and kin, that man must be encased in the triple-brass of a dense egotism who can feel that the germ-stock represented in his proper person is wholly best for survival.

Mr. Pearson talks eloquently and impressively of the possibility of breeding for intelligence and character. He makes us understand that in those nations in which families of brains and righteousness perpetuate their kind by mating with similars, leaders are likely to arise, and that such nations may be the "dominant factors in civilisation by the end of the century." But he does not suggest any specific means to this end. The

method presented to us by a consideration of the results of breeding in the case of lower animals, namely, the method of compulsory mating, is of course out of the question. And the method once suggested of employing eugenic certificates as a basis for marriage is, it seems to me, scarcely less impracticable. If we wish to apply the principle of positive eugenics to the betterment of the race we must consider the ways and means by which voluntary mating may be influenced in the right direction. There are certain misalliances on the physical side that occur altogether too commonly and that might be prevented. In the case of an obvious disease such as leprosy public opinion will not sanction the marriage relation, and indeed the element of self-protection is sufficient to save the sound in body from exposing themselves to the danger of such a relation. There are however certain diseased conditions which in the matter of physical danger are scarcely less dreadful than leprosy that have not been put under the ban. In a way they are more dangerous than leprosy because they are concealed from public knowledge, and by way of marriage these diseases are communicated to wholly innocent persons. An awakened public conscience is needed to drag these conditions into the light and to provide such laws or customs as will insure that those entering into a marriage contract do not thereby expose themselves or their offspring to a hidden but serious physical danger. It seems incredible that those afflicted with such diseases should deliberately enter upon the marriage relation and thus endanger the health or life of those they profess to love — but the records show that such is the case. Public sentiment

must be aroused against this unjust practice and it is to be hoped that the common sense of mankind will eventually sanction the suggestion that proper health certificates shall be a customary feature in marriage arrangements.

As regards misalliances on the mental side, if I may use this phrase, it is evident that eugenics must exert its influence through the agencies of education and appeal to the higher qualities rather than by means of legislative enactments. It is a misfortune from the eugenic standpoint to have the intelligent mated with the stupid, or the high-minded with the low in character — it seems to be a case of mixing pure gold with a baser metal.

But so long as we hold to our good custom of founding marriage mainly on affection and mutual attractiveness, it is a difficult and delicate matter to influence the direction that fancy may take. Mr. Galton looked at the subject in a practical and sensible way. He calls attention to the fact that it is our custom to allow many considerations to play a minor part in this question of selecting one's partner for life — considerations of race, of religion, of occupation, of financial standing, etc. etc., and what he hoped for was, that as a result of a general education in regard to the influence of heredity, eugenical considerations also may take their part among those factors whose additive influence determines the choice that is made. This is a moderate and conservative suggestion, but quite sufficient to give point to an educational propaganda. It is likely in the long run to prove wiser and more beneficial than an advocacy of more radical measures. In spirit and intent it accords

very well with the advice of the wise and experienced in such matters at all times. "Marry only for love," said William Penn, "but be sure that thou lovest what is lovely." This sage aphorism may be interpreted to mean that we should so cultivate our appreciation of what is best in humanity as to be attracted only by those who possess desirable qualities. I fancy that this state of things is what positive eugenics hopes to accomplish or to aid in accomplishing; not by force, not even by deliberate persuasion, but by bringing to the consciousness of educated people a realisation of the fact that the welfare of the next generation will be influenced by the way they marry, as well as by the way they live.

V

EUGENICS: ITS DATA, SCOPE AND PROMISE, AS SEEN BY THE ANATOMIST

HARVEY ERNEST JORDAN

THE purpose of this lecture is to attempt to arouse intelligent interest on the part of university students in the new science of eugenics. I have selected my materials and shaped the discussion with a view to best meeting the needs as I understand them of the average student. I have moreover attempted, as far as seemed practicable, to employ primarily such illustrative data as I have myself touched in my work and my special interests; and further to include in my discussion more particularly those aspects of eugenics which would seem to make a singular appeal to youth and the spirit of altruism.

Whoever treats the subject of eugenics sympathetically and from the biological viewpoint must employ very much the same basic facts, but he can choose his illustrations from quite a variety of materials. Interpretations can not differ very markedly; conclusions can be stated only more conservatively or more radically. My own notions of a working programme are conservative; however, in an attempt to present the full force of the genetic data with reference to their eugenic significance, I may perhaps at points seem to err on the side of radicalism. My main mission, I take it, is to arouse interest and to stimulate independent thought.

Eugenics is the science of good birth. It deals with parents and offspring. One of its chief immediate concerns is to discover the principles that govern human heredity and variation. It desires to influence human matings in the interests of future generations in accordance with well-established facts of inheritance. It aims to produce a better race by better breeding. It does not aspire to create; it seeks merely to prevent subtraction and contamination, and by appropriate combination of the best hereditary traits now in existence or in future to arise to produce a race of thoroughbreds, considered physically, mentally and morally. Eugenics is applied evolution in the interests of humankind.

The word "eugenics" was first used by Sir Francis Galton, the founder of the science, in his book, "Inquiries into the Human Faculty" published in 1883. The foundations had already been laid in Galton's book on "Hereditary Genius," published in 1869. This, like Mendel's pioneer work four years earlier, was for many years neglected. Pasteur's studies on microorganisms, and the rediscovery of the Mendelian principles of heredity in 1900, gave a new impetus to the bio-social study of man. With renewed zeal and interest Galton returned to the work in the interests of eugenics in 1901 when he delivered the Huxley lecture of that year before the Anthropological Institute of London on "The Possible Improvement of the Human Breed Under the Existing Conditions of Law and Sentiment." Then the science of eugenics leaped into prominence. Pasteur, who laid stress on the importance of the factor of environment with respect to man's

well-being; Galton, who emphasised the importance of the factor of heredity to this end; and Mendel, who stated the law of the inheritance of organic characters, thus laying a scientific foundation for the social direction of human evolution, had now received a universal hearing. Present indications point to the ultimate realisation of Galton's hope, namely, that the concept of eugenics may enter the national consciousness like a new religion.

The foundation of eugenics is heredity. Eugenics does not ignore the importance of environment. Both heredity and environment are absolute essentials. The science which aims to improve the race through improvement of the environment has come to be known as euthenics. Eugenics is concerned with that still greater improvement, even in a perfect environment, made possible by application of the principles of heredity. The sole difference between eugenists and euthenists is one of place of emphasis. Co-operation is the secret of ultimate complete success. But surely heredity comes first; environment can only follow. As Barrington and Pearson put it, "The first thing is good stock, and the second thing is good stock, and the third thing is good stock, and when you have paid attention to these three things, fit environment will keep your material in good condition. But no environment or educational grindstone is of service unless the tool to be ground is of genuine steel — of tough race and tempered stock." ¹ Bad environment may spoil the best inheritance, but no environment however ideal can lift an individual beyond the upper level of inherited po-

¹ Eugenics Lab. Pub. No. 5.

tentialities for development. Professor Pearson rates the influence of the environment at less than one-tenth that of heredity.

Eugenics aims at race preservation and regeneration. Race-degenerating factors or influences are designated as dysgenic or cacogenic. The two main aspects of eugenics are positive and negative. Positive eugenics seeks to improve the race by encouraging greater reproductivity among the racially fitter, the civically more worthy, stocks. Negative eugenics aims to prevent contamination and degeneration by prohibition of parenthood to the obviously and grossly unfit. The peculiar means employed by positive eugenics are mainly educational, by negative eugenics legislative.

Opposed to eugenics is also the doctrine of "eudemics." This proclaims the welfare of the "common people" as the vital desideratum, in the belief that worthy leaders and geniuses will continually arise from among the masses regardless of dysgenic or eugenic factors. It represents largely a *laissez faire* attitude towards racial interests. Eugenic and euthenic endeavours may have pessimistic phases, but they are largely prompted and supported by the spirit of optimism; eudemics, on the contrary, seem to contain elements of cynicism and hopelessness. Effective work for racial improvement must build upon a foundation of optimism.

Surely all must have been impressed with the recent great interest and activity in eugenics. There are now national and municipal and university eugenics societies almost the civilised world over. National and international eugenics and genetics congresses have met; in

Dresden and in Paris in 1911, in Geissen and in London in 1912. There are now a number of special eugenics laboratories and technical eugenics and genetics journals. Almost every journal of almost every description has had its eugenics article. Eugenics touches and impresses every possible human interest. What has happened in recent years? Why all this activity? Is there actually danger? Are signs appearing among modern nations similar to those which accompanied the demise of Babylonia, Egypt, Greece and Rome? What then is the trouble? The trouble is implied in a statement by Whetham, "Although the suppression of the best blood of a country is a new disease in modern Europe, it is an old story in the history of nations and has been the prelude to the ruin of states and the decline and fall of empires." The care of our defectives already costs the United States \$100,000,000 annually. According to statistics it has been calculated that within 50 years the ratio of the fit to the unfit will be as 1:1, i.e., there will be just one sane person, for example, to look after one insane. This of course is an extreme prediction; but it serves to impress eventual possibilities unless conditions are materially altered.

I wish to disarm at the outset several stereotyped criticisms of the eugenics propaganda. First this perennial "human stock-farm" idea. To attach this idea to the eugenics programme falsifies historical and contemporary facts. Eugenics recognises love of the highest and noblest quality as a cardinal factor in the achievement of its ideal. But it would have love *intelligent*. The converse, however, does not follow; not all so-called "love-matches" are eugenic. Eugenics

recognises certain matings which should be emphatically discouraged and even legally disallowed, where ethical appeals fail of potency. Probably the last trait the eugenist would surrender in his programme of race-regeneration would be human love. An environment void of parental love is inadequate for the full development of innate mental and moral possibilities. I need develop this point no further. But, as Doctor Adolphi Pinard of Paris remarks, eugenists "must bravely approach the civilising of *the reproductive instinct*, which alone has remained in a barbarous state amongst all the so-called civilised nations from the earliest times."²

Secondly, eugenics does not aim alone at the preservation of brute physical strength. A strong and healthy physique is recognised as fundamental, but not absolutely essential to lofty intellectual and moral attainments. Eugenics recognises the fact that mental and moral characters are hereditary, and possibly by the same law as physical traits. And in our day moral qualities are decidedly as valuable and desirable as simply physical strength. A capacity for honesty is perhaps just as truly hereditary as the colour of eyes or shape of nose. Rational eugenics will not lose the future Keats', or Spencers, or Newtons, or Napoleons, as has been feared. It will produce more of their kind. And it may be able to combine such superb intellects with a strong physique, and to that extent increase their power and influence.

Thirdly, it does not preach a fatalistic creed. It is probably not wholly true that man is like a watch, wound up once for all, destined by inexorable law to

² Problems in Eugenics, 1912; p. 459.

run a certain way at a certain speed willy nilly to a certain point definitely determined by heredity. Only the upper limits are probably inexorably fixed. Man is more than mechanism. Man is spirit also. Science has just begun to touch the outer fringe of the realm of spirit. The resources that here lie hidden for aid in conflict with inherited evil tendencies and weaknesses, are all but limitless, and known in some small part I am sure to each man in a peculiar and specially personal way. Of course, there are probably very definite bounds set to physical and mental attainments. But how few men fathom these to the depth of inherited potentialities! One never knows until one has tried what are the environmental and psychic possibilities in correcting hereditary deficiencies or obliquities.

The manly attitude here is the heroic and the altruistic. Seek to develop to the utmost your possibilities; be reconciled to your limitations if you are convinced you have discovered such; if deficiencies are serious have the wisdom to make an alliance such that your offspring may not be similarly limited or worse; or if such course is impossible the welfare of the race demands magnanimous self-sacrifice. For example, one may inherit a bald head; this deficit can be made good by a wig. One may inherit a hare lip; this can be fixed by modern surgery. But one such should not marry into similar strains. One may have inherited the phthisical diathesis; tuberculosis may be obviated by wise choice of environment and strict measures of hygiene; but such should not marry into a similarly handicapped strain. One may have inherited a thirst for strong drink; but if one never tastes of alcohol, one can never become a

drunkard. However, if the struggle against the inherited weakness demands so much of time or effort as to appear to counteract the worth of results one should manfully acquiesce to society's demands that such defective protoplasm be cut off. In short a person is a bundle of a million of possibilities good and ill. Unless the ill traits be of very low survival value, attention to the full development of the good may hide for all practical purposes the relatively ill. But knowledge of grave deficits in one's germ-plasm should give one pause before he lightly accept the responsibility of handing on the deficits to future generations. Common sense controls eugenic practice, and has here the same supreme importance as elsewhere. If ability to sing, for instance, determined survival, happiness and usefulness of offspring, then those without this ability should not intermarry. Since one can make a living and be of service in a thousand other ways, such a disability is no bar to marriage. The common-sense attitude is this: if you need to sing a little bit you can probably acquire enough ability for all practical purposes; but don't miss becoming a great engineer by wasting time trying to achieve the impossible, a career as a public singer; also if you marry one of like limitations, don't expect Carusos and Melbas among your offspring.

The Weismannian interpretation of the relationship between the germ-plasm and the body *may* be correct. Acquired characters of education, culture and physical development *may not* be capable of transmission to offspring. Personal achievements apparently have no direct influence upon progeny. But this even if proved

does not free from personal responsibility. It is scientifically established that the germ-plasm may be *injured* to the detriment of offspring. If the germ-plasm cannot apparently be potentially improved it can certainly be made to deteriorate. Moreover, Weissmannism may not express the whole truth. The more recent Hering-Semon hypothesis of engram action or cell memory recently so fully developed by Professor Francis Darwin,³ son of Charles Darwin, *may* express much truth. According to this hypothesis in a final analysis every deed, even every thought, is somehow registered for good or ill in the germ-plasm, as a cell-memory, to reawaken to organic expression in one's offspring. This hypothesis gives an almost appalling seriousness to life; but its possible truth must act as a powerful incentive to a high endeavour and a pure life. And it is most encouraging to think that one may perhaps be instrumental in positively lifting the race to higher levels as well as being simply, but in actual fact, a guardian of a stock of hereditary factors which by ignorance or mistake may be tainted to the injury of posterity.

In the fourth place, to repeat, neither good heredity nor good environment can accomplish the potentially possible except by acting conjointly. A fish cannot live in the tree tops, nor an idiot become a scholar even at the best of our universities. Both favourable heredity and favourable environment are absolute essentials. A perfect heredity unfolding in a perfect environment will yield the superman. Darwin long ago wrote, "No man is so ignorant as to breed from his worst ani-

³ Science, Vol. 28, Nos. 716 and 717, 1908.

mals"; and we well know that sweat-shop conditions of industrial life may make consumptives even of athletes.

It is a popular fiction that "men are born free and equal." Nothing really is further from the truth. There are as great differences among human beings as obtain between the crab-apple and the Albemarle pippin, and for essentially the same reasons. As Davenport puts it, "Men are born *bound* by their protoplasmic make-up and *unequal* in their powers and possibilities." ⁴

It is an accepted dictum also that man has an "inalienable right to life, liberty and the pursuit of happiness." But we are still denying continued life to certain individuals guilty of certain crimes against society. The eugenicist desires to know also an individual's *ideal* of happiness before he will accord to him the uninterrupted pursuit thereof. Many ideals of happiness are anti-social and subversive of racial welfare. The eugenicist also fearlessly labours to prevent reproductive liberty to that individual who in the prosecution of that liberty would contaminate the stream of life and injure the future race.

But the impression should not be left that recognition of the value of good stock and of the importance of heredity is of recent development. It is probably as old as reasoning man. The prophets Jeremiah and Ezekiel both allude to the ancient proverb, "The fathers have eaten sour grapes and the children's teeth are set on edge." The idea is expressed in Deuteronomy where Moses speaks of God as "visiting the in-

⁴ Heredity in Relation to Eugenics, 1911.

iquities of the fathers upon the children to the third and fourth generations." Christ asked the question whether men gather grapes of thorns or figs of thistles and replied, "A good tree cannot bring forth evil fruit; neither can a corrupt tree bring forth good fruit." Plato developed the idea in his Republic, and the Spartans practised crude eugenics. Ancient Mythology attributed the deformity of Vulcan to the drunkenness of his father Jupiter. The Chinese for hundreds of years, in deference to the fact of heredity no doubt, have forbidden consanguineous marriages.

Recently eugenics has been put upon a surer basis of scientific facts. But humanitarian advance along certain lines threatens to work racial havoc. However, scientist, statesman and churchman are coming to understand each other better; they are uniting in a common humanitarian effort in the interests of the race as well as of the present generation. This new emphasis of the claims of the future and the race is awakening a world-wide more intelligent interest in eugenics and its foundations, and promises to convert society into that Utopia of which More wrote, and that Kingdom of Heaven on Earth of which Christ spoke.

Galton puts it thus: "Eugenic belief extends the function of philanthropy to future generations. It renders its actions more prevailing than heretofore by dealing with families and societies in their entirety, and it enforces the importance of the marriage covenant by directing serious attention to the probable quality of future offspring. It strongly forbids all forms of sentimental charity that are harmful to the race, while it greatly seeks opportunity for acts of personal kindness

as some equivalent to the loss of what it forbids. It brings the tie of kinship into prominence and strongly encourages love in family and race. In brief, eugenics is a virile creed, full of hope, and appealing to many of the noblest feelings of our nature." ⁵

In the earlier history of the human race natural selection through a struggle for existence worked a survival of the fittest. The fit were successively those of brute strength, cunning and intelligence. The fittest is he who combines the three in proper proportions. A later evolution superposed the soul, or the ethical sense. With the birth of morals came humanitarian sentiments. Charity has counteracted the beneficent influence of natural selection. Promiscuous and unguided by scientific wisdom it works for a condition of reversed selection. It favours the unfit at the expense of the fit. Eugenics would take no backward step; it could not countenance abandonment of rational charity; but it must somehow neutralise the dysgenic effect of misguided emotional charity.

Do you realise that only about 12 per cent. of the present generation, that is only about 25 per cent. of the marriages of a period, produce 50 per cent. of the next? I need but ask the question, "Who constitutes this 12 per cent.?" You well know it is not preponderatingly our racial best. Our nation is in peril to the extent that this includes the unfit whom eleemosynary activities carefully shield and produce. Do you realise that about 10 per cent. of our population is defective, an economic and social burden, and a constant source of racial menace and contamination? Only about 1

⁵ Essays in Eugenics, V: Eugenics as a Factor in Religion, p. 70.

per cent. of this portion is in institutions where any effort whatever can be made to prevent reproduction of this type. Only about 10 per cent. of all feeble-minded are in institutions—or can be—and the feeble-minded are the race's gravest source of injury. Do you realise that the fecundity of defectives is at least about twice as great as that of the average of our population? And as to the intellectual classes, Oxford graduates barely numerically reproduce themselves, and Harvard graduates do but little better.

In New England many of the old family names are dying out by reason of decrease in the number of offspring and the scarcity or total absence of males in the later generations. One family of which I have the data from the year 1610, given me by the last adult male member, will suffice for illustration: The data include 10 generations. In the first three, males were produced in excess in the proportion of 9 to 7; in the succeeding six, females were produced in excess in the proportion of 22 to 15. The average number of births per generation is approximately 6; but in the last four generations there is a sharp and regular decline from 9 to 5 to 3 to 2. The last generation includes 7 females and 1 male.

On the basis of Davenport's work on epilepsy in New Jersey, we know that the number of epileptics doubles every thirty years.⁶ It seems very clear then if present conditions continue the Anglo-Saxon race is eventually doomed. What remedy does eugenics offer? And what are the scientific data upon which its proposals rest?

⁶ Davenport and Weeks. *Eugenics Record Office Bull. No. 4, 1911.*

For illustration of the working of Mendelian inheritance, upon which eugenics so heavily rests, I shall take the case of use of the hand. This involves a brief discussion of how we probably came to be right-handed. The early representatives of the race, the Neanderthal men for sake of concrete instance, were probably ambidextrous, i.e., they used either hand equally well for all manipulation. The child, recapitulating its racial history, is ambidextrous until somewhere about the seventh month. The race and the child become either left-handed or right-handed — or in a few cases may remain ambidextrous. However, what is ordinarily called ambidexterity in the adult is more probably left-handedness superposed on which is acquired right-handedness. We shall not here inquire how fundamentally right-handedness arose.⁷ Once arisen those who could not conform perhaps largely perished by natural selection. From those who varied in the left-handed direction, and escaped elimination, present left-handed individuals have probably come. Left-handedness and right-handedness may be considered alternative or unit characters in the Mendelian sense. In the germ-plasm of the one may be said to be the determiners for left-handedness; in that of the other for right-handedness. In terms of presence and absence, to which scheme the majority of Mendelian characters appear to conform, right-handedness may be conceived as dependent upon the presence of the determiner in the germ-plasm, left-handedness and ambidexterity as the result of its absence. But right-

⁷ See "The Inheritance of Lefthandedness." *American Breeders' Magazine*, 1911; also "Studies in Human Heredity," Bull. Phil. Soc. University of Virginia, 1912.

handed individuals are of two sorts, those both of whose parents were right-handed, and those with only one parent right-handed. The former are said to be of the duplex, the latter of simplex condition. Those with both parents left-handed i.e., lacking the determiner for right-handedness are said to be nulliplex. The right-handed condition dominates or masks the left-handed condition in the hybrid generation. When left-handed mate with left-handed all the children will be left-handed. When the determiner for a character is absent from the germ-plasm of the parent, that character cannot appear in the body of the offspring. When simplex mate with simplex, one in every four will be left-handed. This is the well-known 1 to 3 Mendelian ratio for hybrid crosses with respect to a particular pair of unit characters. When simplex mate with nulliplex one-half of the offspring will lack the determiner for right-handedness and be left-handed.

In the classical experiments of Mendel with peas the results are still more certain and clear. And they have been verified in the case of many instances in animals and man. The example of blue and brown eyes worked out by Professor C. B. Davenport⁸ in this country, and by Major C. C. Hurst⁹ in England, is especially striking and conclusive. The above given ratio of 1 to 3 for crosses of simplex hybrids and 1 to 1 for simplex with nulliplex cross could result only if the special condition were fulfilled with respect to the determiners of the pair of contrasting characters, namely, that they be contained in separate germ-cells. That is, no germ-cell, either male or female, could contain both

⁸ Science, 1907, vol. 26, p. 589.

⁹ Nature, 1907, vol. 76, p. 558.

the determiner for left-handedness and for right-handedness — or, in conformity with the presence and absence hypothesis only one-half of each class of germ-cells could contain the determiner. Then assuming a random mixture of such germ-cells from hybrid male and female there would be one chance of a germ-cell with a left-handed determiner meeting one of its kind, to one with a right-handed determiner meeting one of its kind, to two chances of a germ-cell with a right-handed determiner meeting one with a left-handed determiner. Again the law of chance under the altered condition of simplex crossing with nulliplex will give the one to one ratio. The foregoing discussion has dealt with the three central concepts of Mendelian inheritance; 1) *unit characters*, i.e. such as apparently defy further analysis and comport themselves as units in inheritance; 2) *dominance*, by virtue of which one of a pair of alternative characters dominates or masks the other in the first hybrid generation; 3) *segregation*, producing a *purity of germ-cells* with respect to a particular pair of unit characters. Pure dominants and pure recessives always breed true. Hybrids interbred always produce dominants and recessives in the proportion of 1 pure dominant to 2 hybrid dominants to 1 pure recessive. This may on first hearing seem very complicated. The significant fact is that definite law underlies human possibilities for development. Chance is restricted to a limited number of possible combinations of the biparental stock of unit characters.

At least several score of human traits, physical, mental and pathological are now thought by some to conform more or less closely to this scheme. There is

not time to dwell upon numerous apparent exceptions, e. g. blended inheritance (imperfect dominance), as an instance of which the mulatto was, until recently, cited; Galtonian or ancestral inheritance, in accordance with which one is thought to inherit to the extent of $\frac{1}{2}$ from his parents, $\frac{1}{4}$ from his grandparents, $\frac{1}{8}$ from his great-grandparents, and so on; and particulate inheritance giving the mosaic or piebald condition. Suffice it to say that were it not for exceptions genetic research would by now be very uninteresting indeed; new data are gradually bringing these exceptions into conformity with Mendelian principles. Let me summarise this much: man is not a blend, he is a complex, a mosaic of which only part of the pattern is patent, an equal part hidden. If the determiner for any portion of the pattern is lacking in the germ-plasm it can never appear in the soma unless introduced from another line of descent. Germany and Austria are said to have become so impressed with the hereditary aspect even of pauperism and defect as to forbid marriage to recipients of poor relief.¹⁰

There is some very suggestive evidence that essentially the same principles govern the transmission of mental and moral qualities.¹¹ Galton showed statistic-

¹⁰ Problems in Eugenics, p. 482.

¹¹ However, there is as yet no complete agreement respecting the precise significance of certain published human pedigrees, that is, whether they warrant or contradict Mendelian interpretation. The unit—character—factorial hypotheses of Mendelian teaching is at present assailed by certain workers, viewed only symbolically or even sceptically by others, and is by many regarded as insufficiently established. But dissensions among scientists regarding the *laws* of inheritance must not be suffered to obscure for us the *fact* of inheritance, and the urgency in consequence of preventing reproduction among defectives, and of encouraging an economically reasonable fecundity

ally by a study of the families of the judges of England between 1660 and 1865, that the chance of a son of a judge showing eminent ability was about 500 times as great as that for a man taken at random from the population. Galton's study of the parentage of the Fellows of the Royal Society showed equally convincingly that intellectual ability is hereditary. Schuster's analysis of the class lists of Harrow and Oxford yielded the same unequivocal evidence. The Italian biologist, Antonio Marro, has recently called attention in support of the potency of hereditary influence to his observations that the Gauls and Germans still preserve the moral qualities noted by Cæsar and Tacitus centuries ago. Attention is to be directed to such stocks as that of Vesalius, the pioneer anatomist, whose ancestors back four generations were distinguished physicians. The history of the Edwards family of Connecticut is well known; as also that of the Lee family of Virginia; and the Breckenridge family of Kentucky. The history of the Darwin family tells the same story. The Bach family comprises 20 *eminent* composers and two score of less eminent. Davenport calls attention to the tenacious qualities of the peculiar protoplasm that matured a Bach at 22, a Beethoven at 13, and a Mendelssohn at 15. Mozart is said to have composed at the age of 5, Potter to have shown extraordinary artistic

among the fitter stocks. Mr. Roosevelt touches the real heart of the matter viewed positively and practically when he says: "The fundamental point to remember is that if there are not in the average family four children, the race goes back, and that the element with three children is stationary, and that the group where the average family has two children or less represents a dying element in the race." *Outlook*, Jan. 3, 1914.

talent at 15, and Titian at 13; and Burns was celebrated as a poet at 16.¹²

Similarly with respect to defect, delinquency, vagrancy, inebriety, pauperism and crime. The histories of the Jukes and Nams¹³ of New York, the Hill Folk¹⁴ of Massachusetts, the Ishmaelites¹⁵ of Indiana, the Swiss family "Zero," and the Kallikak¹⁶ family of New Jersey give unmistakable evidence that these conditions are the result of defective germ-plasm, not bad environment, and are as strictly hereditary as eye colour or shape of ear.

Likewise with respect to many pathological characters, e.g. nervous and mental defects, cancer, nephritis, rheumatism, tuberculosis, alcoholism, etc. The available evidence very forcibly suggests that the morbid condition is due to the lack of a determiner upon which the normal condition or resistance to infection depends. Inter-marriage of similarly seriously defective individuals is fraught with very grave dangers to the immediate offspring and the future race.

This leads me to speak briefly of consanguineous marriages. The evil effects of in-breeding are sadly patent in isolated districts as the islands along our Atlantic coast, and in inaccessible mountain sections. The human stock is here characterised by an unusual incidence of physical and mental defects, the latter the more obtrusive. Close inter-marriage is the secret of the de-

¹² Heredity in Relation to Eugenics.

¹³ The Survey, March 2, 1912.

¹⁴ Eugenics Record Office Report, Aug., 1912.

¹⁵ O. C. McCulloch: The Tribe of Ishmael. Inc. National Conference of Charities and Correction, Buffalo, N. Y., 1888.

¹⁶ H. H. Goddard: The Kallikak Family, 1912.

cay of some of the royal families of Europe — Iso of the strength of some, as can be explained. On the island of Marken, some miles off the coast of Holland, the inhabitants have intermarried for many generations. Everybody is close kin by this time. The stock is said to be universally scrofulous, and the population of Marken is probably doomed to rapid extinction unless marriage with the Amsterdam Dutch, their nearest neighbours, is facilitated. I have personally some half dozen very significant histories of the evil of in-breeding. The following will suffice for illustration. A man of high intelligence married his first cousin. They had 5 children, 3 boys and 2 girls. All suffered from maniac depressive insanity, all remained unmarried, and all died about the age of 35. The two girls were, besides, deaf-mutes and left-handed.

But in-breeding is exactly what the stock-breeder resorts to in producing a strong pedigreed stock. Why this paradoxical result that the same procedure in one instance preserves, in the other causes deterioration? The stock breeder deals with pure pedigreed stock. He breeds only from the perfect respecting the points he considers valuable. To cross such with unknown stock would mean contamination and deterioration. Few human stocks are strong at all points. Those closely related are likely to combine similar strengths and weaknesses. Strength in some points in the presence of grave weakness is of little avail. A strong arm on an imbecile, or a strong brain in a consumptive are of relatively small value. In cross-breeding weakness and defect are in general recessive to the corresponding normal condition. One with weak kidneys thus, for ex-

ample, might marry one with weak lungs, and reasonably expect only healthy offspring. Such children if they married cousins would be very likely to have a considerable proportion of offspring combining the latent weakness, now becoming patent because nulliplex or duplex, in the presence of which strength in other points, could be of little avail. Close intermarriage involves grave risks to the offspring and the race, and should be discouraged in the absence of pedigrees indicating absence of danger.

In apparent disproof of the eugenist's belief that mental and moral qualities follow the same basal laws of inheritance as have been established for many physical traits, you may be able to cite numerous instances of this nature: a man of great intellect and superb character, has only inferior or indifferent children. But I ask you to look a little deeper before you complete your inference. Every case must be judged in the light of the environment.¹⁷ If the environment under which the son of a great man is expected to develop into an equally great man, on the assumption that intellect is hereditary, is materially different from that in which the father actually did develop, it is manifestly unfair to conclude in consequence of failure so to develop, that mental and moral qualities are not hereditary. The potentialities for such development may have been transmitted from father to son, but a pampered environment may have suppressed or left undeveloped the innate paternal traits, and in consequence produced a vagrant or a roué. Mistaken parental love often gets the better of wise judgment and eliminates from the child's environ-

¹⁷ Both pre- and post-natal.

ment the very things needful for the full development of the best hereditary endowments. Given the same stock of inheritance, environments characterised by stress and struggle on the one hand, and by ease and luxury on the other, can no more produce the same mental and moral result than they could physical result. The product of one would likely be marked by mental, moral and physical strength; of the other, mental, moral and physical weakness.

We must consider briefly also the eugenic aspect of war.¹⁸ We are spending to-day almost \$1,000,000 a day in support of the army and navy.¹⁹ This expenditure must be met by the people of this country in the shape of taxation. Taxation has doubled in the past 15 years. With rise in the cost of living and increased direct and indirect taxation, income shrinks appallingly. There results a postponement of marriage, itself working a lessened fecundity, coupled with smaller families among the moderately circumstanced, and a relatively increased fertility among the less fit who feel no keen social and racial responsibility. On a peace footing, the army and navy eliminate from productive and reproductive life approximately a quarter of a million picked men, in many respects the best the country has. The French and German armies of to-day on peace footing number each more than half a million men in actual service. This is more than 5 per cent. of each country's men between the ages of 18 and 35. The guardians of the world's peace number 6,000,000 men; on war foot-

¹⁸ Eugenics is vitally concerned also with immigration and race mixtures.

¹⁹ "Pensions, 1912, \$152,986,433.72; Army, 1912, \$93,088,664.00; Navy, 1912, \$123,518,549.00; total, \$369,593,646.72." (L. J. W.)

ing 20,000,000. France is said to take annually 2 out of 3 of all her young men arriving each year at military age. And the birth rate for France has already fallen 1 per thousand below the death rate. I need dwell no further upon the racial significance of this feature of militarism.

But what happens in actual war? Enormous quantities of dollars are deflected from productive use. This of itself has its grave racial effect as shown above. But still more seriously we kill men; and these the best a country has. From 5 to 10 million men were lost in the 20 years of the Wars of the French Restoration and Empire. One-third of these came from a single nation whose total population at the beginning of the war was 25,000,000. The Thirty Years' War cost Germany nearly three-fourths of her fighting men, about 10,000,000. In the last quarter of the 19th century, the direct war losses totalled several human millions. Remember also that approximately for every young man lost in war a similarly splendid young woman remains unmarried. Rome declined and fell when her "human harvest became bad," the results of long continued conscription and using its young manhood as fighting material. The "drooping spirit" of Europe is undoubtedly due to no small extent to its recent waste of its greatest asset, splendid young manhood and womanhood. Think of the racial havoc of the wars of Napoleon. Napoleon said, "I have an income of 100,000 men!" 3,700,000 of the "elite of Europe" were slain by Napoleon. The bonded war debt of the world is already about four times the amount of all the coin and bullion in the world; about

one-half the value of all the property of the world. During the War between the States we lost 1,000,000 men and these were largely of the best we had. These can never be replaced. America perhaps will never reach the level of her potential world-influence because so many of her best of a generation or two ago are gone without leaving adequate representation. The contra-selection worked by war is sufficiently indicated by the fact that from 30 to 50 per cent. of the German and French conscripts and voluntary enlistments in England are rejected by the examining boards as unfit for service because of undersize, infirmities and disease.

But this is not the whole story of militarism's racial menace. The venereal diseases are to-day recognised as among the most serious of dysgenic agencies. For all venereal diseases the proportion in England was 32 per 10,000 of those applying for enlistment and rejected. Of those admitted to the army hospital, the proportion was 1,000 per 10,000. Professor Kellogg speaks as follows: "The Army is a veritable breeding ground of the most dysgenic of human diseases. While phthisis and cancer carry off their subjects at the rate in England to-day, of 1,000 per year to each 1,000,000 of population, syphilis kills only 1 per million. It is therefore not a purifying but wholly a contaminating disease."²⁰

Facts such as these supply a portion of the argument against war and preparation for war, both of which are readily seen to be racially destructive. If either

²⁰ Problems in Eugenics, p. 230.

were really any longer a necessity they might be patriotically tolerated. But arbitration has settled so many international disagreements during the past 50 years that it would seem to have fully demonstrated its efficacy and practicality for the satisfactory solution of all probable misunderstandings between civilised nations. War being unnecessary, large standing armies and vast navies are an extravagance to say the least. Moreover, the foremost nations are financially and economically so interdependent that war between them is the remotest possibility. War between England and Germany, for example, would be as disastrous to victor as conquered, and almost as disastrous to France as to either. In fact such a war would probably be altogether impossible, because none of these nations could borrow any considerable amount of money in the face of an already enormous bonded war debt, to carry on war for any length of time.

Professor Cattell's recent suggestion regarding the disposition of the army would seem to merit very serious thought by our coming leaders, namely, to have it care for the great federal engineering projects, safeguard the health of the people, inspect foods, do police duty in towns and rural districts, build good roads, secure pure water, and adequate sewerage. He suggests that all officials of either the State or the municipality (both men and women) should be members of the United States Army. They should be subject to drill and discipline. This would insure at all times a well-organised and efficient army (and corps of nurses) for defence and the suppression of riots. Such a plan

would make civil war impossible. "The object of the army," says he, "should be education and creation, not destruction and dissipation."²¹

Mr. Ginn's suggestion²² that an international army and navy be established for guarding the world's peace, by a union of about 10 per cent. of the present naval and military equipment of the foremost nations, appeals to me as eminently sane and practical, and as deserving consideration by those whose interests can embrace the peace of the world.

Let me call your attention here also to an investigation of Professor Pearson's of London. Stated in greatest brevity, Pearson has disclosed a decided lowering of the English birth rate at a number of definite periods corresponding closely to certain factory acts reducing the economic value of children and applying to bleaching and dyeing works, to copper, steel, and iron industries, namely the Workshop Regulation Act of 1867; the Education Act of 1876; the Factories and Workshops Act of 1878; the Mines Act of 1887; and the 1891 act as to labour by women and children.

Pearson believes that the present precarious condition of England with respect to the birth rate is "a direct effect of the destruction by legislation of the economic value of the child." He advocates "reversal of all legislation which penalises the parentage of the fit, and the restriction of all charity which favours the parentage of the unfit." "We must directly or indirectly," says he, "produce differential wages for the fit

²¹ *Popular Science Monthly*, April, 1912.

²² The World Peace Foundation Pamphlet series, April, 1911, No. 1, Part III, p. 8.

parent: in other words there must be endowment of fit parentage at the expense of the unfit parent and of childless men and women."

To quote further, "When we regard the present 6 or 7 million pounds a year — soon to be 10 or more millions — given to a mere environmental reform, which is applied long after the reproductive age cannot possibly produce any permanent racial change, how deeply one must regret the want of knowledge and of statesmanship, which overlooked the naturally disastrous policy of the factory acts, and did not seek its opportunity to endow parentage rather than senility with those annual millions! Even as a party cry I believe the endowment of parentage would have been effective; as a step to meet grave racial dangers it would have possessed real insight."²³ Here is occasion for serious thought and noble action on the part of the young men whose lives will be cast more especially in spheres of legislative influence.

In France also there is activity along these lines. Here, however, there is perhaps more of practical work and less of oratory and essay. The various agencies which seek to counteract present economic conditions which tend to penalise motherhood and to handicap the man of family are cast largely along eugenic lines. Numerous bonuses to large families and concessions to the married here tend to preserve the middle class, the backbone of any nation, the source from which under present conditions, the men of ability and genius must be recruited. For example in the city of Paris, every workman receives at marriage a gift of 100

²³ Eugenics Lab. Lect. Series V., 1909, p. 31.

francs. Married workmen receive a gift of 100 francs each at the birth of a child. The mother, if she is in work or in service, has a right to six weeks' holiday on full pay. Every workman who has more than three children on his hands under the age of 16 receives the sum of 100 francs per annum for each child after the third. In the colonies also of England, Germany and France research, agitation and legislation along eugenic lines is advancing.

I do not want to be understood as wholeheartedly subscribing to the full programme of maternity pensions and differential wages. I believe the scheme must be safeguarded with many checks and qualifications. Without some coincident machinery allowing for alteration of cases *pari passu* with changing circumstances, I believe this scheme does more racial harm than good. Those racially least deserving will not hesitate to accept its benefits. The more deserving will perhaps feel too much self-respect. Only a lower type it seems to me can accept state paternalism. A condition of reversed selection thus results. The unfit will increase inordinately relative to the more fit.

Eugenics is very much interested also in two of the church's sacraments, namely, confirmation and marriage. Practically and briefly confirmation should, among other more commonly accepted interests, embrace also instruction and consecration in matters of racial responsibility. Sex and sex-relationship should here be given the impress of things holy and sacred. If the home and the school will not do this service, the church cannot with impunity shirk it. Professor

Slaughter²⁴ claims that if the church is to grasp its modern opportunity, failing which he thinks there is little need of it, it must utilise its sacraments of confirmation and marriage for their true purpose, namely, in the interests of an idealism which recognises the responsibility laid upon the present by the future. Confirmation is the psychological moment for instilling the eugenic ideal, and of awakening pure and noble aspirations for being instrumental in the elevation of the race. Sex is perhaps the most sacred gift vouchsafed to man, and ignorance of its real significance is fraught with untold misery to the individual and unending injury to the race.

Still more practically, as minister, having won the love, respect and sacred confidence of my charges in confirmation, I would give every boy an opportunity to pledge himself to a life of continence until marriage, and every girl to the enforcement of the single standard of morals — not on any mystical or sentimental ground primarily, but for the very practical reason of personal gain in happiness and efficiency and of racial welfare. If the Church will do this for mankind, peculiarly fitted as it is for this service, she will establish unbreakable bonds of love and gratitude, and do a very real and Christ-like work for the little children that He loved, and upon the feet of whom the world will have to move forward — or perchance backward.

As to marriage; very many more churches should follow the courageous example set by the authorities of the Cathedral of SS. Peter and Paul of Chicago, under

²⁴ The Eugenics Review, October, 1909, p. 9.

the leadership of Dean Sumner, of refusing to give the Church's sanction and blessing to a union where serious physical or mental taint may bring suffering and incapacity to an innocent party either of the present generation or the future offspring. Surely the requirement of medical certificates guaranteeing freedom from venereal disease or serious genetic deficiency as a qualification for church marriage is in no way discordant with practical Christianity.

Where are we then, and what can we do as conscientious, high-minded, rational and conservative eugenists? We can at least think the matter out for ourselves, and then show the courage of our convictions in word and deed. And I want to appeal to the altruism of the youth here represented to harbour and cherish the eugenic ideal. You are carrying the sacred flame of life. Be resolved that through no conscious fault of yours shall it be dimmed. You represent terminal links in a chain and knots in a network of life. May the future links and the coming web be not weakened at your hands. But this is not all. You *are* your brother's keeper! Your brothers are the human race. Even patriotism should move you to want to make the American race the best and most virile of history. Wherever you go, whatever your profession in life may be, racial conservation, the eugenic ideal, needs your guiding counsel, your valiant help.

And I want especially to solicit the interest and aid of the coming legal profession. Negative eugenics claim our immediate attention. Effective procedure demands appropriate legal assistance. Unless we somehow at once cut off our defective protoplasm it

would seem that as a nation we are in grave danger. As I said above we are segregating only about 1 per cent.—and this not effectively—of the 5 to 10 per cent. that ought to be forbidden reproductive liberty. It is perhaps economically impossible at this juncture to adequately isolate our defectives. We are perhaps at the point of a crisis. We need the help of eugenicists, to be sure, but what we most insistently need at present is a workable law authorising the humane procedure of sterilization of the grossly defective, alarmingly fertile, anti-social class. Twelve States in our Union now have such laws, but they are nowhere operative due to circumstances that test cases have come before the courts under the constitutional prohibition of “unusual and cruel punishment.” Attorneys-general are loath to bring these cases to trial; meanwhile the action of the law is stayed. The mistake it seems to me was to have considered this sterilization law a portion of the Penal Code. Sterilization can probably not be defended as a punitive measure. The Bill of Rights would seem to be violated. But such laws are perhaps not properly included in the Penal Code. They are peculiarly public and racial health measures, and as such should form part of the health code, to be administered under the State Police Powers.²⁵

I want to quote a recent statement by Dr. Lewellys F. Barker, Professor of Medicine at the Johns Hopkins University, “Public opinion has not been properly formed as yet in this matter (of eugenics). So-

²⁵ Even thus framed and interpreted the law has recently been declared unconstitutional in New Jersey.

ciety must be brought to the point where it realises that it is its duty to protect itself against the propagation of a degenerate stock. Only after it has been brought to its senses and shown that inebriates, epileptics, the insane and the feeble-minded, when they become parents, are much more likely than are healthy people to have children with insane tendency, with alcoholic tendency, with epileptic tendency or with other degenerate tendency, can much progress be made."²⁶

I believe I have now included everybody's possible interest. Whether man or woman and whatever your sphere of activity, more especially if you enter law, medicine, philanthropy or the church, you have a sacred eugenic responsibility. And unless one take very serious thought, and act in accordance with the best counsel he may readily become the cause of considerable racial subtraction and contamination. Moreover, just as we are now guarding the *public health*, so it is our yet more clear and sacred duty to guard the *health of the race*, by every humane effective means at our command.²⁷

²⁶ "On the Prevention of Racial Deterioration and Degeneracy, Especially by Denying the Privilege of Parenthood to the Manifestly Unfit." Pamphlet, 1910; p. 9.

²⁷ For a complete bibliography of American works on eugenics in general, the reader should consult "Die Rassenhygiene in den Vereinigten Staaten von Nordamerika" by Géza von Hoffmann. J. F. Lehmanns, Munich, 1913.

VI

EUGENICS FROM THE POINT OF VIEW OF THE GENETICIST

PROFESSOR H. T. WEBBER.

Introduction — The science of eugenics is concerned with the improvement of the human race through better breeding. It is generally recognised that the laws of heredity that maintain in animals and plants, are also in general applicable to the human race. The practice of careful methods of breeding to maintain the various races of animals and plants in the highest possible state of perfection is known to be a necessary factor in successful agriculture. Until very recently, however, no attempt has been made to apply the same principles to the improvement of the human race. Hundreds of men in every State are giving their time and attention to the improvement of plants and animals, but as yet only a few dozen men in the entire United States are engaged in the study of eugenics.

The present era is characterised as one of great advancement in all directions. Human time has become so valuable that the intelligence of the world is largely directed toward the devising of labour-saving machines. We now gin our cotton by machinery; we harvest and thresh our grain by machinery; we card and spin by machinery; and we knit and sew by machinery. These machines increase the efficiency of man to the extent of

many millions of hands. We dash from one corner of the earth to the other on iron rails; we spin from one place to another in horseless carriages; we have no time to walk; we telegraph and telephone without even the trouble of stringing wires; the impossible has been accomplished and we even fly — no longer the impossible dream but a reality.

All of this has been accomplished to save man's time and allow him greater opportunity to seek enjoyment and to guarantee to him greater safety in living. Yet what of man himself? In his hurry to help himself man has forgotten himself. It is estimated that man in the abstract is only half efficient. He lives only half his allotted time and meanwhile eats twice as much as he should. Half of those that are born to him die before reaching a productive age or are incapacitated by being mentally deficient. Three per cent. of our population are sick all the time and unable to work. According to statistics compiled by the Eugenics Committee of the American Breeders' Association ¹ in 1900 (the twelfth census) 634,877 or .8 per cent. of the population of the United States were under custodial care. It was also estimated that at least 3,000,000 or nearly 4 per cent. were more or less defective but not under State care, while around the border line just above this class, were 7,000,000 or nearly 10 per cent. of our total population. In the light of such figures can man be considered an efficient machine? Ruskin asserts that "There is no wealth but life," and Tille affirms that "A nation is composed not of property nor of provinces, but of men." It is fortunate, then, that

¹ "Problems in Eugenics," Vol. I, p. 464.

at last attention is centering on man himself. What are we doing and what should we do to conserve human life and efficiency, the greatest source of wealth in the world?

We are told that the cost of living is increasing and on this point we demand no proof. The increasing difficulty of earning a living is patent to all. The complicated life which we live makes it difficult to determine the fundamental causes of this increased cost of living, but it is certain that a considerable portion of the difficulty is due to the increasing number of dependents. The care of the insane, feeble-minded, incompetent paupers, epileptics, deaf, blind, and others under custody, costs about \$100,000,000 annually, and no one can estimate the amount to which this fund would be swollen if we could add to it the funds that are expended privately in the care of defectives outside of institutions and in private charities. Doubtless the greatest of all difficulties is to be found in the comparatively small percentage of the population that are actual producers. The world demands men of greater strength and ability. To succeed the race must be vigorous, vital and healthy. The greatest of all problems is the production of good men and women.

Are we to conclude then that the tide of human heredity is declining? The great advance in knowledge is likely to deceive us into assuming an improvement in mental calibre at least. It must be remembered that one generation builds on the knowledge of the past. Galton estimated that England has produced one man of supreme excellence, where the old culture of Athens produced two hundred. So far as

can now be determined it would seem probable that man in the Stone Age possessed about the same mental power as does man to-day, and, doubtless, was less subject to disease.

Every advance in the science of medicine and surgery serves to prolong life and increase the number of weaklings. True, we would not have it otherwise and welcome every method of conserving human life, but it cannot be doubted that the improvement in medical science has led to the survival and reproduction of a very large number of weak individuals, that under the less civilised conditions of a few centuries ago would have been cut off without progeny. The improvement in our methods of living, the better understanding of hygienic laws, the spread of the Christian spirit, indeed, the developments of civilisation, have tended all over and more and more to protect and nurture the weaklings of the race.

Inheritance versus Environment.—From these and doubtless other causes, defectives and criminals have come to form such a large proportion of the population as to cause serious alarm. We must seek the cause and determine the best methods of remedying the condition. A considerable number of careful students of social conditions have considered that the primary cause of such degeneration is to be sought in the influence of development under bad environmental conditions. There is no denying that environment is a very potent factor in the life of the individual. The development under conditions of extreme poverty with all its attendant evils, improper nourishment and difficulties, is likely to produce poorly developed individuals phys-

ically, and warp and pervert the moral nature. Henry George, Jr.,² ascribes the increase that he finds in insanity, suicide, and crime, to the evil influence of poverty.

Mrs. Ellen H. Richards in her very interesting work on "Euthenics" has given a valuable exposition of this phase of the great human race problem. She would have us believe that the environment, unwholesome food, uncleanness, crowding in tenement houses and the like, are the primary causes of racial degeneracy, and that through the correction of these causes much of the deterioration could be arrested.

The eugenicist, while willing to give weight to such causes as having influence, would not be willing to grant that environment is the main active agency in causing insanity, feeble-mindedness, and criminality. He would maintain that these are heritable characters and are born and not made. We have thus the two doctrines, euthenics and eugenics, upheld as the causes of racial deterioration and decay.

Dr. Davenport³ in a very able article on this subject has summarised the matter as follows: "The thoughtful mind must concede that, as is often the case where doctrines are opposed, each view is partially incomplete and really false. The truth does not lie between the doctrines; it comprehends them both. What a child becomes is always the resultant of two sets of forces acting from the moment the fertilised egg begins its development — one is the set of internal tendencies and

² "Menace of Privilege."

³ Davenport, C. B. "Euthenics and Eugenics." *Popular Science Monthly*, January, 1911.

the other is the set of external influences. . . . Development is a form of behaviour and how a child shall develop physically, mentally and morally is determined not by conditions alone, not by blood alone, but by conditions and blood; by the nature of the environment and the nature of the protoplasm."

So much emphasis has been placed in literature on the importance of environment that it is desirable to consider its effect rather fully and arrive at a correct understanding of its influence so far as its importance in breeding is concerned. Lamarck and his followers assigned to environment an all important part in directing and inducing variation and evolution in plants and animals. In Darwin's exposition of evolution environment played an equally important part but in a very different way, acting primarily as a selective agency, the survival of the fittest being the main part of the theory. It remained for Weismann, however, to clearly define the environmental problem in its relation to heredity, which from the eugenics standpoint, is of the most fundamental importance. Weismann concluded after a painstaking investigation of the subject, that acquired characters are not inherited. By acquired characters was meant characters acquired during the life of the individual. In general, his conclusions are now commonly accepted and would form the basis of our general understanding of the subject in eugenics. A stalk of corn that had grown to excessive height because of having grown under exceptionally favourable circumstances, would not transmit to its progeny its greater size. A man dwarfed and deformed by ill usage and hardship during his life would not be expected to

transmit his dwarfed and misshapen form to his progeny. In like manner if a man reared under bad moral influences and in poverty, developed criminal tendencies, he would not necessarily be expected to transmit these tendencies to his progeny unless he had inherited a weakness in this direction. The germ cells are differentiated early in the development of the embryo and are not influenced by any ordinary effect of environment. In the case of excessive use of alcoholic stimulants and drugs, apparently there may be an influence as will be pointed out later. So far as the effect of environment on heredity is concerned it may thus be concluded that in the human race, as in plants and animals, environment is of secondary importance.

It is also doubtful if we have not over-estimated the effect of environment on the development of the individual. In Galton's study of twins there was found no tendency for similarity of education and home life to render those originally unlike any more similar with advancing years. Woods⁴ in his study of royalty has arrived at similar conclusions. He states: "Yet, in spite of the fact that the environments show wide variations, these appear to be negligible factors in the production of successful achievement or in the creation of virtuous or vicious types. That successful achievement is almost entirely due to differences in germ plasm and is little influenced by environment is the necessary conclusion."

⁴Woods, Dr. Frederick Adams. "Mental and Moral Heredity in Royalty." New York. Henry Holt. 1906. And "Laws of Diminishing Environmental Influences." *Popular Science Monthly*, April, 1910.

Thorndike's⁵ study of twins in the schools of New York City led to similar conclusions. He shows that "Such likenesses and differences in environment as act upon children living in New York City and attending its public schools are utterly inadequate to explain the likenesses and differences found in the traits measured and are in all probability inadequate to explain more than a small fraction of them."

Pearson and his pupils have arrived at similar conclusions from a study of the relative influence of heredity and environment on the eyesight of children.⁶

Woods⁷ in summarising his studies on this subject states "In fact it will be surprising if any one succeeds in demonstrating an important environmental control acting on psychological differences, exhibited in different mental and moral traits. All the evidence that we possess renders it highly improbable that any of the ordinary differences in human environment, such as riches or poverty, good or bad home life, have more than a very slight effect in modifying these complex and high organic functions, the improvement of which is the hope of the altruist and the reformer."

It would seem that the effect of nurture or environment on the individual may have been over-estimated but whether it is as yet safe to draw such sweeping conclusions would appear doubtful. That Woods' conclusions will hold in cases where the necessities of life

⁵ Thorndike, E. L. "Measurements of Twins." *Arch. of Philosophy, Psychology and Scientific Methods*. New York Science Press, 1905.

⁶ Amy Barrington and Karl Pearson. "A First Study of the Inheritance of Vision and the Relative Influence of Heredity and Environment on Sight." London, 1909.

⁷ Woods, Frederick Adams. *l.c.*

are provided seems probable, but in the squalid conditions existing in the slums of cities where children are poorly nourished and housed and where the home life is the poorest we can imagine, it is doubtful whether traits will not be developed that under more wholesome conditions would not be shown. We may, of course, explain mental deficiencies or moral depravity developed under such slum conditions as due primarily to inherent heritable tendencies which the life of the individual has only served to accentuate.

In general biology the whole question of the effect of the environment on the individual during its life and the effect of such change on the germ plasm is again being opened up and even here we must await further evidence before any positive conclusion can be deduced. If this is true in the case of animals and plants it is even more markedly true in the case of man.

It would seem certain that there should be no interruption in our attempts to improve such bad environmental conditions, at least until more conclusive evidence is available, and in any case Christian charity and decency demand that such cesspools of humanity be purified and elevated so far as lies within our power.

The Laws of Heredity.—Regardless of what influence is assigned to environment, it needs no argument to convince us of the importance of heredity. The fact that we inherit from our ancestors our various physical and mental characters is too well known to require proof. Until recently, however, the understanding of how characters were inherited was so indefinite that it was not possible to formulate principles. According to Galton's law of ancestral inheritance the

offspring contained half of the blood or heritage of each parent and one-quarter the heritage of each grandparent and this quantitative idea of inheritance with all its indefiniteness was the best explanation available until in 1900 when the now famous Mendelian principles of inheritance were brought to attention. It is to these laws or principles of inheritance that we owe the great advancement which has been made recently in the study of heredity. We recognise men by their distinctive characters and rarely do we have acquaintances so nearly alike but that we can easily recognise their different facial expressions. One individual has blue eyes, another black eyes; one light blond hair and another black or brown hair; one straight hair, another curly hair.

In the study of inheritance the different distinct characters of this kind are studied rather than the ensemble of all characters. It has been found that characters are inherited as distinct entities and follow definite laws of segregation and recombination. It is a well known fact that a child may inherit its eye colour from one parent and its hair colour from the other parent, and the recognisable characters of a child in general are a mosaic of the characters of its parents. To understand the inheritance of characters, it is necessary to have a clear conception of what are termed contrasted pairs of characters or character pairs. An individual cannot have blue eyes and at the same time black eyes, or be both tall and short. These are illustrations of character pairs. The majority, if not all, of the characters in which one individual differs from another form such character pairs.

It is recognised, of course, that a character is not transmitted as such from parent to child but the germ cells which unite must contain the units or potentialities which lead to the formation of such characters. The theoretical units of protoplasts which represent the character and are carried over in the germ cells are designated as determiners, and are to be understood as merely theoretical units. It is not known in what form the character determiner is carried over in reproduction but that it is carried over is certain.

In the case of eye colour, it has been found by Davenport and by Hurst that the characteristic colour of the eye is due to the formation of pigment in the iris. When no pigment is present the eye is blue and different shades of brown or black are produced if pigments are present. If an individual having blue eyes is mated with another having blue eyes, no pigment determiner being present in either case, the eyes of the offspring will be blue. If an individual with black eyes and transmitting the black eye determiners is mated with an individual with blue eyes, i. e., without the determiner for black iris pigment, the resulting offspring will receive the pigment determiner from the black eyed parent and will have black eyes, as the pigment determiner received from one parent will be sufficient to cause the development of pigment and the blue colour will be covered up or masked. The body cells of this offspring will contain the determiners of both characters, that is of the presence of pigment (black) and the absence of pigment (blue), but when the germ cells are formed, the contrasted characters segregate and certain cells receive the black pigment determiners; while in certain others,

no pigment determiners are received, and these transmit blue eye colour. There are thus formed two types of germ cells so far as this one character pair is concerned. Such an individual is able to transmit either black or blue eye colour.

If this individual that forms approximately equal numbers of germ cells with the black pigment determiners (black eyes) and without the pigment determiners (blue eyes) is mated with an individual of similar germinal constitution, i. e., transmitting both black and blue, it will be seen by careful study that there will result four possible combinations of the characters under consideration. If we let large B stand for the dominant black pigment determiner and small b for blue or the absence of black pigment, the four possible combinations would be $B \times B$, $b \times b$, $B \times b$, and $b \times B$. Of these resulting unions the first, $B \times B$, would give an individual with black eyes and transmitting only this character. The second combination, $b \times b$, would give an individual with blue eyes as no black is present and would be able to transmit only the blue eye colour. The other two unions $B \times b$ and $b \times B$, are in reality the same, as it makes no difference from which parent a determiner is derived, and would give individuals with black eyes that would transmit both blue and black since they would form two kinds of germ cells with reference to this character pair. Thus is obtained the famous Mendelian formula $1 BB: 2 Bb: 1 bb$, so far as gametic constitution is concerned, or, if considering the colour of eye exhibited by the offspring of such unions, the formula, 3 black: 1 blue.

This law of segregation of characters in the germ

cells and their recombination in fecundation has furnished the basis for an intelligent understanding of the inheritance of characters in plants and animals and an interpretation and understanding of many phenomena of inheritance that were before entirely unintelligible.

The Origin of New Characters.—In the study of human breeding it is also important to question where and how new characters arise. The study of this question has naturally been limited mainly to plants and animals. Time will permit only the statement that it is now generally conceded that new characters usually arise suddenly, as so-called mutations, and when once formed are usually inherited. As illustrations of the sudden origin of such characters the cases of extra toes, taillessness, double spurs, and webbed toes in poultry that were studied by Davenport, may be cited. Such characters usually arise complete and perfect in the first generation and are usually in considerable degree heritable.

Not infrequently similar abnormal characters are produced in man, as for instance extra toes or fingers, webbed toes and fingers, albinism, and the like. Doubtless such characters as hairlessness and taillessness in man were originally produced suddenly in the evolution of the human species, as has been the case in the origin of similar characters in certain races of dogs and poultry. Not infrequently individuals of plants and animals with new characters arise suddenly and perfectly developed forming the beginnings of new races. Such was the origin of the first dwarf cupid sweet-pea, and such has been the origin of many of the now important races of plants and animals.

There is little evidence to indicate that new characters of value are likely to form in man. The characters that most commonly arise suddenly in man that may be termed new characters, such as extra fingers, club-foot, and the like, are usually to be considered as abnormalities the addition of which to our human heritage would be a decided detriment. Yet such human characters are in many instances known to be heritable and to apparently follow the Mendelian law of inheritance as above outlined. The network of human heritage is contaminated with the determiners of many such detrimental characters.

Inheritance of Human Characters.—Evidence as to the method of inheritance of human characters is more difficult to obtain than in plants and animals, but the careful studies, particularly of the Eugenics Record Office at Cold Spring Harbor, L. I., in this country, served to show that apparently a very large number of characters in general follow the Mendelian law of inheritance as outlined above for eye colour. It is of the highest importance for the advance of practical eugenics that the method of inheritance of all important characters be determined at the earliest possible date.

We now know that eye colour, skin colour, hair colour, hair form, curliness or straightness of hair, stature, obesity, and the like, are in general, inherited in conformity with the Mendelian principles. General interest in the inheritance of human characters centres primarily on the inheritance of mental and physical defects and deformities. It matters little whether we fully understand the scientific theories of such inherit-

ance, as we are concerned here primarily with the fact of inheritance.

The studies of Goddard on the inheritance of feeble-mindedness furnish numerous instances that show con-

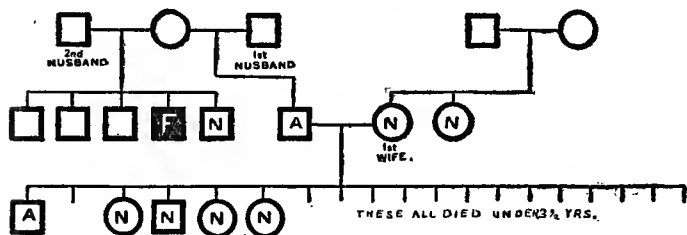


FIG. 1. INHERITANCE OF FEEBLE-MINDEDNESS (Goddard).

clusively the heritability of this most common defect. Figures 1 and 2 show one of nature's experiments studied by Goddard. The central union in Fig. 1 is of an alcoholic man with a normal woman. The result of this union was 19 children, of which 13 died in

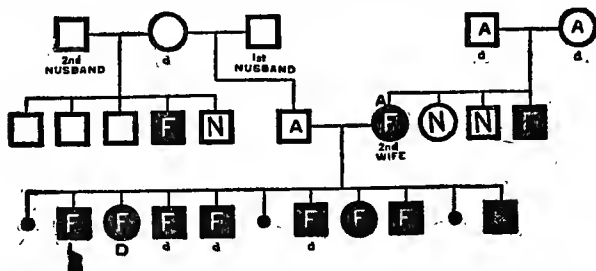


FIG. 2. INHERITANCE OF FEEBLE-MINDEDNESS (Goddard).

infancy, 3 are distinctly normal, 1 is alcoholic, and 1 is neurotic. This alcoholic man had a congenital defect in the number of joints in the fingers but none of the 19 children showed the deformity. It should be

noted that he had a feeble-minded half-brother but otherwise the pedigree is fairly clear.

Later this alcoholic man married again and his second wife (Fig. 2) was an alcoholic, feeble-minded woman, who had a feeble-minded brother and whose parents were both alcoholic. The result of this union were 8 feeble-minded children, 1 of which was also deaf. All of these 8 children inherited the father's

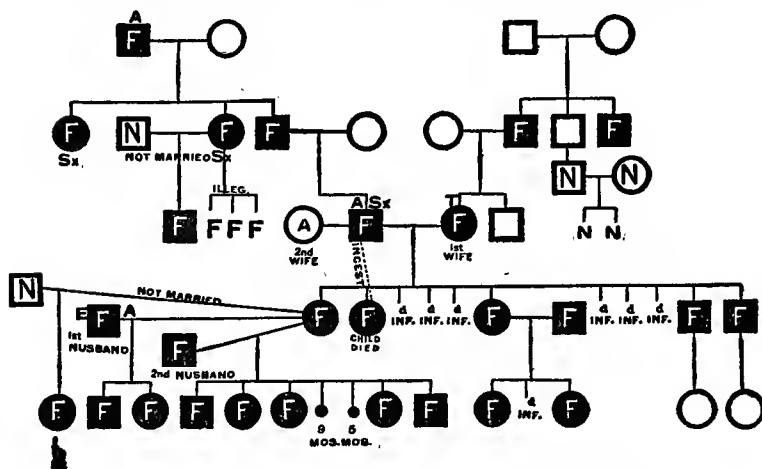


FIG. 3. INHERITANCE OF FEEBLE-MINDEDNESS (Goddard).

defective fingers. Apparently the first wife was prepotent and overcame her husband's abnormality. The second wife, however, with weakened alcoholic germ cells allowed him to transmit his abnormality.

A case that would be difficult to equal in its exhibition of sexual depravity and transmission of debased mentality (also from Goddard) is shown in Fig. 3. Here a feeble-minded, alcoholic, sexually immoral man married a feeble-minded, tuberculous woman.

The pedigrees of both as far back as known show serious mental defects. The result of this union was 11 children, 6 of which fortunately died in infancy. One daughter had 10 children by three different men, all feeble-minded and all practically illegitimate as conception in each case took place before marriage.

The study of feeble-mindedness indicates that this character is to be considered as a Mendelian recessive in its inheritance and that from two feeble-minded individuals, in general, only feeble-minded offspring can result. It must be remembered, however, that there are various degrees of feeble-mindedness and the methods of determining the degree of this deficiency are as yet too inaccurate to give fully trustworthy results. The frequency of the occurrence of feeble-mindedness in the children of alcoholic and sexually degenerate parents is noteworthy. It has also been estimated that about 16 per cent. of the feeble-minded come from consanguineous marriages.

Similar to feeble-mindedness in its inheritance are also such defects as epilepsy and insanity. In Fig. 4 is reproduced one of the charts from Davenport and Weeks' study of the inheritance of epilepsy,⁸ which shows in marked degree the association of epilepsy with such defects as feeble-mindedness, alcoholism, vagrancy, criminality and sexual degeneracy.

Insanity exists in many different forms and is closely related to other neurotic defects. Cannon and Rosanoff state that "One of the first facts that appeared

⁸Davenport, C. B., and Weeks, David F. "First Study of Inheritance in Epilepsy." Bull. No. 4 Eugenics Record Office. Nov. 1911. Fig. 6.

in the study of pedigrees was that any form of insanity or even all the forms of hereditary insanity do not constitute an independent hereditary character, but that they are closely related to imbecility, epilepsy, hysteria, and the various mental eccentricities that are not usually included under the designation insanity.”⁹

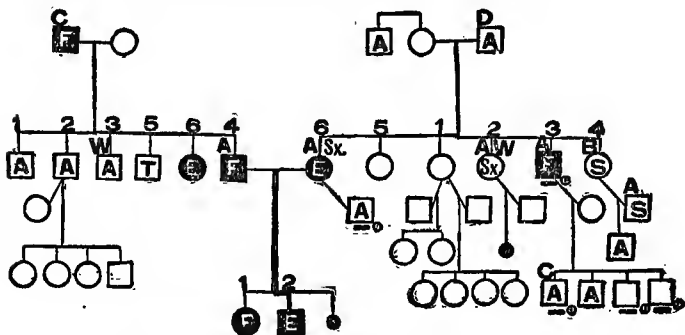


FIG. 4. This chart shows the product of a feeble-minded man and an epileptic, opium-eating, unchaste woman. The father's father was feeble-minded and a "criminal" and, besides the man in question, he had an epileptic son, and three alcoholics, of whom one had the vagrant tendency (W). The mother's germ-plasm does not show up much better, for she has a feeble-minded and alcoholic brother, who lives at the almshouse, an alcoholic sister who is a prostitute and a vagrant, and three alcoholic nephews of whom one (C) has been in jail (4). Two children were born alive to this pair 35 odd years ago. The first was feeble-minded and died before she was fourteen, the second is at the State Village for Epileptics. Case 2857. (*Davenport & Weeks*.)

The interrelation of such mental defects has also been emphasised by Davenport, Mott and other students of the subject. Figure 5, a pedigree given by Cannon and Rosanoff shows the inheritance of insanity

⁹ Cannon, Gertrude L. and Rosanoff, A. J. Preliminary Report of a Study of Heredity of Insanity in the Light of the Mendelian Laws. *Journal of Nervous and Mental Diseases*, Vol. 38, No. 5, pp. 272-279, 1911. Also republished *Eugenics Record Office Bull.*, No. 3.

and its association with epilepsy and neuropathic disorders.

It is needless to repeat further pedigrees of such degenerate families. Cases of similar families are doubtless known in almost every community. Some localities, however, are nearly free from insanity as shown by Dr. Southard in his study of the geographical distribution of insanity in Massachusetts. He found that

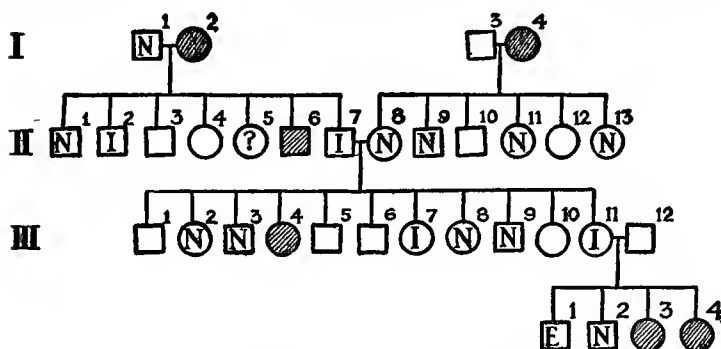


FIG. 5. The central mating, II, 7, II, 8, is that of a man, II, 7, who is subject to melancholia and has an insane brother and another who is neuropathic. His wife is normal but her mother was neuropathic. The product of this union is 11 children of whom 3 are neuropathic. One of these insane children marries a normal person (probably of neuropathic ancestry), and has 2 neuropathic children besides 1 that is epileptic, IV, 1. E, epileptic; I, insane; N, normal; shaded symbols imply some neuropathic condition other than insanity. (Cannon and Rosanoff, 1911.)

in three island townships and nine scattered townships in the Berkshire Hill region there had been no insane committed during the decade 1901 to 1910, while in twelve other regions the commitments had been at the rate of 15 per 1000 and in the highest of these at the rate of 19 per 1000. In general, the districts of highest commitment presented distinctly worse medical and

social conditions indicating that insanity occurs in the background of more general diseases, suggesting a correlation between insanity, crime, pauperism, and disease.¹⁰

That criminality and pauperism are inherited and related to such mental defects as feeble-mindedness, epilepsy and insanity, can scarcely be doubted after a study of the now famous history of the Jukes and Zero families, together with the more recent and careful studies of Estabrook and Davenport on the Nam Family and of Danielson and Davenport on the Hill Folk. Let us hope that there are not many such degenerate families, but doubtless there are many more than we would expect.

In a recent investigation in a region in New Jersey known as the "Pines," it was found that 1 out of every 155 of the inhabitants was a dependent. One degenerate woman, known as "Mag," had furnished to the State 292 descendants of which 174 were degenerates of various types, imbeciles, criminals, drunkards, sexual degenerates, and the like.

The evidence regarding the inheritability of various neuropathic diseases shown by the families studied by Davenport and Weeks, will form an interesting summary to this part of our discussion.

INHERITANCE OF MENTAL CHARACTERS

Feeble-minded × feeble-minded 142 children, all feeble-minded.
 Feeble-minded × feeble-minded 21 children, 16 feeble-minded,
 5 epileptic.

¹⁰ Southard, E. E. "Notes on the Geographical Distribution of Insanity in Massachusetts, 1901-1910." *Am. Breeders' Mag.*, Vol. III, pp. 11-20.

Feeble-minded × insane.....	15 children, 9 normal, 1 epileptic, 4 feeble-minded, and 1 neurotic.
Feeble-minded × normal....	17 children, 7 normal, 10 defective.
Feeble-minded × alcoholic...	61 children, 5 normal, 10 epileptic, 17 feeble-minded, 5 neurotic, 1 sexually immoral and 23 died early.
Epileptic × feeble-minded....	21 children, 5 epileptic, 16 feeble-minded.
Epileptic × epileptic.....	3 children, all epileptic.
Epileptic × neurotic.....	53 children, 22 normal, 15 epileptic, 3 feeble-minded, 9 neurotic, 2 alcoholic, and 2 sexually immoral.
Epileptic × normal.....	35 children, 16 normal, 19 defective.

The association of alcoholism, syphilis and tuberculosis with mental degeneracy leads to the question as to whether such degeneracy is not stimulated or caused by these poisons acting in the system. Dr. Mott states, "I have many pedigrees which seem to indicate that a perfectly sound stock may degenerate from a combination of pathogenic factors, viz., stress of town life, alcoholism, syphilis and tuberculosis, occurring in the progenitors in successive generations."¹¹

Davenport and Weeks,¹² in discussing alcoholism as a cause, derive evidence that alcoholism is an actual cause of defective offspring rather than merely an ac-

¹¹ Dr. F. W. Mott, F.R.S., "Heredity and Eugenics in Relation to Insanity." "Problems in Eugenics." pp. 400-428. 1912.

¹² Davenport, C. B. and Weeks, David F. l.c. p. 25.

companying mental weakness that cannot resist the temptation of alcohol, from the fact that the proportion of defective offspring exceeds the Mendelian expectation. Families studied by them gave the following increase in defectives over the expected number:

<i>Matings</i>	<i>Per cent.</i> <i>defective</i>		<i>Per cent.</i> <i>expected</i>
Alcoholic × defective.....	87	instead of	50
Alcoholic × tainted.....	32	instead of	25
Alcoholic × normal.....	36	instead of	25

They conclude, however, that the hypothesis that alcohol is a "race poison," demands further investigation.

Dr. Mjöen, of Norway, gives a very interesting case of the increase of feeble-minded in Norway when freedom was given to the distillation of brandy. In some districts almost every farmer distilled brandy from his own corn and potatoes and the number of feeble-minded in such districts increased from 1816 to 1835 almost 100 per cent. The country was alarmed and in 1848 the house distillation was stopped. "The enormous increase in idiots came and went with the brandy."¹⁸

Dr. Mjöen cites the results of Bertholet and Simmonds as showing the degeneracy of the germ cells in chronic cases of alcoholism. "Bertholet examined the testicles of 75 persons; 39 of them were habitual drunkards, and in 37 cases he found the testicles of the drunkards more or less atrophied. He sums up, 'The hurtful in-

¹⁸Dr. John Alfred Mjöen. "Effect of Alcohol on the Germ Plasm." "Problems in Eugenics." Vol. II, pp. 172-182. 1913.

fluence of chronic alcoholism upon sexual glands is not to be denied.' ”

Dr. Mjöen, however, is inclined to doubt whether alcoholism has any influence on the offspring when the parents come from sound stock, except when taken by mothers during maternity or lactation. He apparently believes that its action is in weakening and bringing out defects in an already tainted stock.

It is clearly evident that one of the most important eugenic problems is to determine whether such poisons have an active influence in causing mental defects as is certainly indicated by much of the evidence.

The evil effects of consanguineous matings have been recognised by the laws of many States and are well founded. The inbreeding of corn results in lack of vigour as shown by greatly reduced size and finally if continued, in complete sterility. Incestuous breeding in rats has been found to produce a large per cent. of crippled and deformed individuals and finally leads to sterility. In poultry it produces disease and sterility. In man the evil effects are shown in the increased number of imbeciles, insane, epileptic, and the like, and by dwarfing in size, deafness, and various diseases. In almost all of the degenerate families that have been studied such as the Jukes, Zero and Nam families, and the Hill folks, consanguineous matings and incest are of common occurrence. The knowledge obtained from plants, animals and man is in accord on this point. Darwin has summarised this law in plants in his aphorism “nature abhors self-fertilization.” The eugenic statement would be, consanguinity abhorred by nature leads to deformity, disease and early death.

Reference only can be made to the inheritance of other human characters. The rapidly accumulating evidence indicates that such characters as deaf-mutism, colour-blindness, night-blindness, cataract, hemophilia, cerebral hemorrhage, hernia, cancer, tuberculosis, and the like, are in many cases heritable, or at least the weakness that predisposes the offspring to attacks of the disease is heritable.

Many cases of physical deformities such as club-foot, brachydactyly, syndactyly, extra fingers and toes, hare-lip, and the like, also run in families and are in considerable degree heritable, as are also peculiar forms of various organs. Punnett says, "The Hapsburg lip was as unmistakable in King Alfonso and his children as in the Emperor Maximilian."

Fortunately it is not only defects and peculiarities that are heritable, but desirable traits, as is well known, are inherited in a similar way in families. Musical ability, mechanical ability, and the like, show almost the same type of inheritance as neurotic defects. The history of many great families furnishes indisputable evidence of the importance of the hereditary transmission of such traits.

The Crossing of Different Races.—The problem presented by the crossing of different races has as yet been little studied and in this country is one of very great importance. The laws of most of the States of the Union declare as illegal marriages between whites and negroes, or descendants of negroes having more than one-fourth or one-eighth of negro blood. The laws of Oregon declare as void the marriages of white persons with persons having one-fourth or more, blood

of negro, Chinese or Kanaka, or more than one-half Indian blood. Already the race problems of the south and west have assumed alarming proportions. We cannot but recognise the negro as an inferior race and the blending of a lower with a higher race, judging from our present knowledge must necessarily result in debasing or lowering the general standard. The negro in Africa to-day, as emphasised by Alfred Holt Stone ¹⁴ is "just what we know him to have been since he first appeared on that continent." The average negro in the United States to-day, is contented, happy and unambitious, desiring only sufficient food to supply his needs. Judging from my own observations in the south, which have been somewhat extended, indulgence in alcoholic drinks is the negro's besetting sin, as it is unfortunately with the weak minded of other races. The negroes are lax in morals and think little of the marriage bond. According to Wilcox, the eleventh census showed that "in the southern States there were six white prisoners to every ten thousand whites and twenty-nine negro prisoners to every ten thousand negroes, while in the northern States there were twelve white prisoners to every ten thousand whites and sixty-nine negro prisoners to every ten thousand negroes." ¹⁵ Many causes such as the low moral tone of the family life, doubtless contributes to this excess of negro criminals, but when all factors are considered I think we cannot deny that a considerable portion of this greater percentage of criminality is due to a distinct racial dif-

¹⁴ "Studies in the American Race Problem." New York, 1908.

¹⁵ Wilcox, Walter F. "Negro Criminality." Published as appendix in Stone's "Studies in the American Race Problem."

ference. Wilcox concludes that "the causes may be grouped as defective family life, defective industrial equipment and ability in comparison with their competitors, increasing race solidarity among the negroes, and increasing alienation from the whites."

It has been pointed out by a number of students that the great majority of the negroes that achieve distinction, as for instance, Douglass, Bruce, Lynch, DuBois, Washington, and others, are mulattoes. Among pure negroes, however, there is great variation in ability and occasionally a superior individual is produced that even judged by the most severe standards must be considered as great. The race, however, must be judged as a whole and the effect of the mixture from actual cases. The admixture of white blood clearly improves the offspring in mental efficiency but there is no evidence to indicate that such offspring is better in any way than the white parent, and it is reasonable to assume that they would be inferior. The claim has been made that the progeny of such a cross are physically inferior to either race and more susceptible to disease, but the evidence on this point is far from conclusive. Dr. Taylor states that "It is demonstrated by well attested facts that these hybrids of black and white are vastly more susceptible to certain infections; their moral as well as physical stamina is lower than that of either original race."¹⁶

I cannot agree with Davenport who in an address at the International Eugenics Congress stated "Forget unessentials, like skin colour, and focus attention on

¹⁶ Dr. J. Madison Taylor. "The Negro and His Health Problems." *Medical Record*, Sept. 12, 1912.

socially important defects. Then by sterilisation or segregation prevent the reproduction of the socially inadequate. Thus will mentally incompetent strains be eliminated and the good physical traits of some of the black races be added as a valued heritage to enhance the physical manhood of the south." ¹⁷ It is hardly to be presumed from this statement that Dr. Davenport would advocate the crossing of whites and blacks under the existing social conditions. Doubtless he meant merely to emphasise that in the abstract the most important problem is to prevent the reproduction of the incompetent of both races. It would seem to the writer that the crossing of the whites with the negroes, unless followed by the most rigorous selection, would result in general deterioration of our population. By no possible means could the crossing be limited to the best class of either race. On the contrary, it is certainly true that the crossing would be limited to individuals of the lowest classes. The most inefficient and vicious individuals, without pride or moral stamina, would be the only ones to mate. In general the same may be said regarding the mating of any different races. Pride of country and racial pride will prevent, except in rare intervals, the mating of individuals other than those belonging to the lower grades of society.

During slavery times the illegitimate crossing of whites with negroes was condoned and even favoured in some instances, because of the greater value of the mulatto slave. Following slavery for a considerable

¹⁷ Davenport, C. B. "Marriage Laws and Customs," published in "Problems in Eugenics. Papers communicated to the First International Eugenics Congress." London, 1912.

period we sought some consolation from the shame of such continued illegitimate crossing in the thought that by such means the two races would become gradually amalgamated and the great preponderance in numbers of the white race would lead to the swamping of the black and its effectual obliteration. The advance in knowledge of the laws of inheritance has now led to the conclusion that no such swamping of characters ever occurs in crossing. Present knowledge leads to the conclusion that unit characters such as are concerned in the two races are practically indestructible and will crop out in various degrees of perfection and mixture in the progeny.

Nothing would seem to the writer more regrettable than the general amalgamation of the races of the world. Different races have different ideals of life, different methods of living and in most cases occupy different countries. Customs, habits and mental attitude have been fixed by centuries and are not likely to change greatly. Marriages of people of different races are rarely happy and the offspring of such marriages are in most civilised countries, regarded with suspicion and as individuals set apart from the ordinary. They carry with them the stigma of their parentage and cannot escape from it. [They are like the physically defective at whom we stare with vulgar curiosity. How pitiful and dissatisfying must be such a life!

The only factor that would justify the general crossing of any two distinct races would be the achievement of some definite gain. If the amalgamation of two races could be shown to produce an offspring superior to either it might be justified, but there is no evidence

that the crossing of any two human races would yield such superior offspring. If we attempt to derive evidence on the point from the facts of animal and plant-breeding, the conclusion would be against the crossing of human races under the conditions that must there obtain. The most superior individuals among cattle, horses and all domestic animals are those of pure breed, and the best breeders are strongly opposed to the crossing of breeds. The general inferiority of a mongrel lot is well recognised. It is true that by crossing two races and securing numerous hybrids and then carefully selecting similar types for a number of generations we might produce a new race of fixed characters which would be superior to either of the parental races. Such individuals with superior combinations of characters are exceedingly rare, however, and can only be fixed into a race, propagating true, by the most careful selection. No such selection would ever be possible in the case of human crosses and probably among human races, as among animal races, where there would be one good hybrid there would be nine hundred and ninety-nine poor or mediocre individuals.

In the plant kingdom the same is true to a marked degree. The crossing of superior with inferior races without selection can only reduce the general average. In wheat and oats the hybrids of two good races even on an average are much inferior to either race though a superior hybrid race may be secured when accompanied by selection.

The Indian is respected and in a sense admired but the viciousness of the half-breed is notorious in literature and experience. The half-breed Malay, I am in-

formed, is in general regarded in the same way. The Mongolian-Caucasian cross so far as I am informed cannot be considered inferior but is certainly to be pitied.

To disbelieve in the crossing of races does not necessarily mean that we regard one race as inferior to another. Each race may be highly intellectual and well developed physically and be equally successful in the world's struggle for national supremacy, and yet their amalgamation without selection might result in inferior people. It cannot be successfully maintained that the Jersey breed of cattle is superior to the Holstein, or vice versa, but the unselected mixture of the two would certainly be inferior to either.

Practical Eugenics.— The study of human heredity, while of intrinsic scientific interest, would be emasculated of its most interesting and vital function if it were impossible to apply the principles discovered to the improvement of the race. True, it is impossible to attack this problem as one would the breeding of animals and plants, where the individual is of little value and has no rights that must be observed. It is impossible to select and mate simply the best human individuals, thus attention must be given primarily to negative eugenics or the prevention of the reproduction of the lowest classes and defectives. Positive constructive eugenics is mainly limited to the encouragement that can be given to the production of large families among the better classes. Unfortunately the lowest and most degraded hereditary strains reproduce rapidly, the best reproduce but slowly. "The fertility of the helpless is

alarming; the procreation of their kind seems to be their only industry."

The first and most vital step in the improvement of the human race is to prevent the reproduction of such defective classes as the weak-minded, insane, epileptic, pauper, and criminal. Humanity demands that we must care for these classes of unfortunates. They are our wards and must be treated with all kindness. However, human kindness and Christian spirit viewed from any standpoint cannot but consider that in permitting such classes to reproduce further litters of unfortunates, we are inhuman and unchristian. We will not allow a cruel father to beat his child but we will allow the weak-minded, sexually degenerate, drunken sot to freely bring into the world a brood of possibly eight or ten poor innocent defective children, a burden to themselves throughout life, living in squalor and misery, and finally burdening humanity with their care. Humanity should no longer endure the rapidly increasing burden of their care. Caring for such degenerates creates more poverty and *sui generis* more incompetents demanding custodial care because of the greater burden life must carry. Such action will finally bankrupt the world.

It seems clear that the reproduction of such defective classes must be prevented. How then shall it be accomplished? The two methods that have been suggested are (1) isolation during the reproductive period and (2) desexing. Isolation is certainly possible and if no other measure is feasible surely this should be followed and far more extensively and completely than has yet been considered. Desexing has been looked upon

with suspicion and in any case should be very carefully applied. In the case of males where the desexing can be accomplished so easily by the method of vasectomy, which is a very minor operation performed with a local anæsthetic, this method would seem even more desirable and more humane than the continued isolation that would otherwise be necessary. In the case of females all methods of desexing that have been devised are rather serious operations and it would seem that here we might better, at present, use isolation as our principal method. Already eight States have adopted special laws legalising the desexing of certain classes of defectives, but these laws are as yet largely ineffective. In Indiana, the pioneer State in this movement, about 500 have been so treated but in almost every case with the consent of the individual concerned.

Dr. Hurty, the State Health Commissioner of Indiana, in describing the effect of vasectomy says, "Vasectomy is simple, scarcely more serious than vaccination, is without the slightest danger, is not attended with mutilation and may be performed in three minutes without a general anæsthetic. The patient spends not one minute in bed, but immediately goes about his duties."¹⁸ Dr. Hurty makes the very positive statement that the patient is improved physically and in temperament as a result of the operation, but further information regarding this matter is much needed. Certain it is, however, that the patient is not seriously injured by the operation and whether improvement results

¹⁸ Dr. J. N. Hurty. "Practical Eugenics in Indiana." *Ohio State Medical Journal*, February, 1912.

is not a matter of importance as long as there is no serious detrimental effect.

This willingness on the part of so many unfortunate individuals and of their relatives to have their troubles end with themselves, indicates the possibility of a modified law providing for strict isolation of mental defectives but permitting freedom to those harmless ones that undergo the operation of desexing. As the benefits of this method become known doubtless all of those fitted to be at large, male and female, would voluntarily submit to the operation of desexing. In this way might be avoided any conflict or complication arising because of the prejudice of the people against any law punishing, as it were, by personal mutilation.

Other important factors in the solution of the problem are restrictive marriage laws. Only persons of good mental qualities that can present a clean bill of health after actual examination, should be allowed to contract marriage. Consanguineous marriages of first, or even second cousins, should not be permitted when there is taint of weakness in the pedigrees.

Improvement is desired in all grades of people. The whole network of human heredity is contaminated with traits and minor weaknesses that should be eliminated. Here it would seem that education is the only means at our disposal. Many men and women marry knowing that they have characters that should not be reproduced and that render them unfit as parents. Yet they desire a home and are thus led to marry even though hoping that their union will not be fruitful. To such high class defectives modern surgery has given

the eugenic method in vasectomy and there are doubtless thousands that would adopt this method if they were informed regarding it.

Dr. Hurty describes a case of this sort which is of profound interest. "At a certain college in Indiana I met a young man of twenty-two who had a club foot and whose education had been delayed by poverty. He was very serious in his manner, at times almost melancholy, but of bright mind and easily led his class. He confessed to me that he had several times contemplated suicide because of his deformity. 'No whole person can know,' said he, 'the mental torture suffered by those who are deformed. I have gone to the cellar, the attic, and the barn, and cried by the hour over my misfortune. I have cursed my parents for bringing me into the world and have sworn never to marry.' His distress of mind and suffering was very considerable. I learned he had shown some attentions to a young woman who had not repelled him, but he had suddenly dropped her and the matter was a subject of remark among his school fellows. I made inquiries and after a short acquaintance resolved to tell him he could have a home and no fear of perpetuating his deformity. He accepted, and now he has a home with its increase of happiness in his life. He and his wife are content and both bless the good which science brings to mankind."¹⁹

Again there are certain individuals that because they each carry certain defects in a recessive or latent form should not marry each other but may very properly marry some other individual not carrying the character.

In considering eugenic methods attention has mainly

¹⁹ Dr. J. N. Hurty. l.c.

been given to what has been termed negative eugenics or the prevention of the reproduction of the undesirable classes and physical and mental defectives, as discussed above. So far as the control of matings among persons of superior and medium ability, no methods other than persuasion seem to be applicable under our social monogamic system. Education thus becomes the main-spring of constructive eugenics. Only by educating the individual in the laws of heredity so that he may have a clear understanding of the action of these laws, can we hope to make progress. The control of breeding among the higher and most able classes in general, means but little other than to avoid or eliminate defects. If we could so control reproduction that only superior mated with superior, there would be formed class distinctions based on real rather than fictitious differences and the creation of such classes differing in ability would probably not lead to increased happiness and contentment, or to any average increase of intelligence on the part of the population as a whole. True, we want more individuals of very superior ability to advance the world's knowledge, but it is of far greater importance to increase the average ability of the masses and render our population as a whole self-supporting and more capable of enjoying the benefits of civilisation.

To do this means (1) stopping the production of degenerate classes of all types; (2) recognising undesirable traits and educating the people to avoid matings with people possessing such traits; (3) discouraging the rapid reproduction of the lower classes and (4) encouraging through every possible means the reproduction of the better classes of fit matings.

It seems clear that any aid given indiscriminately to mothers of large families, as has been suggested, would only serve to increase the size of families among the shiftless lower types. Premiums for parenthood should be given not as charity but as a reward for the production of able offspring of good heritage. Too large a number of the best people do not marry until late in life and this is a serious limiting factor on the size of families of many of the most fit matings.

One of the most important needs is some new standard or method of judging ability early in the life of the individual so that reward would come earlier. If this could be accomplished proper means would be furnished for the support of a family and prevent much of our now too common celibacy in early life. As a corollary to this a more careful study of children is demanded that we may so provide for their education and nurture as to prevent degeneracy in the inherently able.

As an aid to the development of the human race the writer would urge the great importance of establishing an adequate system of human registration similar to that used in the registration of pure bred stock. At least all of the good eugenic classes could be led to seek registration in such a register.

Such a human registration would serve many useful functions. First and primarily it would stimulate pride in family and the desire on the part of any individual whose ancestors were in the Register to measure up to or surpass that standard. I believe that family pride is the most potent influence in restraining the individual from error and in stimulating him to greater effort. True it is, that occasionally such pride becomes snob-

business but fortunately this is not common and the individual would derive little comfort from his own registration unless his record measured well up to that of his ancestors.

Such a register would include only good and superior individuals, as mediocre or poor grade individuals would never seek to be included in such a pedigree record.

Once started I believe such a registration would be sought by all of the best individuals of society and soon it would come to be almost universal among good families having pride or confidence in their ancestry. Soon, if one is not registered or his family is not registered, the question would arise, why are they not registered? In this way I believe all individuals and families that have not very serious defects in their pedigrees would be led to register and thus the object would be accomplished as we could then be certain that unregistered families could not be considered good constructive eugenic material. Such a register would have great value, doubtless, as a guide to marriage. Suppose a father notices a growing intimacy between his daughter and a young man of apparently good character but of unknown ancestry. The registration number of the young man's father or mother could be obtained and from this, for a small fee, the girl's father could secure a brief outlining of the young man's family history. If this history were bad doubtless it would serve to check any growing intimacy between the two and would save the family much trouble and worry.

For a certain fee we obtain a certificate of title for any piece or tract of land in the country, showing all

transfers and history of the various transactions. Why is it not feasible then, to obtain certified pedigrees of men? The value of such records in furnishing data for scientific studies cannot be over-estimated and in legal and other ways, they would be of great service.

In closing this lecture I desire to impress upon you the importance of studying the subject of eugenics. The science is still in the formative stage and while naturally much difference of opinion exists, nevertheless, very much information of the greatest value has been secured. Study the subject carefully and sympathetically, with the aid of the best available literature. Give at least some of your time and your encouragement to the development of an improved and better humanity. Dr. Saleeby, one of England's most famous eugenicists, has declared, "I am of nothing more certain than that the choice for Great Britain to-day is between national eugenics or the fate of all her imperial predecessors from Babylon to Spain." What is true of Great Britain is doubtless equally true of our beloved Republic. Decadence and disruption will follow unless the present degenerating tendencies can be checked. I have full confidence, however, in the nation's ability to overcome these difficulties. We lead the world in practical knowledge. The necessary knowledge to avoid degeneration is certain to be obtained and out of and from this knowledge will arise a purer, a stronger and a more able population.

VII

THE FIRST LAW OF CHARACTER-MAKING

ARTHUR HOLMES

PART I

THE Greeks were the last nation interested in themselves. For ages people have been too busy doing things to stop and consider the subject and object of their ceaseless activity. But to-day we are taking breath and beginning to pay attention to ourselves. Biology, psychology, sociology, and the human sciences generally, are coming to large places of importance. The human individual is being studied as if he were worth something in himself. His happiness is seen to spring from what he is, not what he owns.

The child especially is assuming his place as the end and purpose of all social arrangements and not as a painful incident in human growth. He is put where nature puts him — as all-important. His care comes first. He must be well-born though women leave their looms and factories stand idle. His health must be preserved though business be revolutionised and the world be sterilised. He must be improved though city blocks are razed and playgrounds take the place of court houses. He is recognised as the greatest single asset of the nation.

Almost the latest movement in his favour is the organisation of a Eugenics Society. Eugenics itself lays claim to the dignity of a science. "Eugenics"

says Davenport, "is the science of the improvement of the human race by better breeding or, as the late Sir Francis Galton expressed it:—'The science that deals with all influences that improve the inborn qualities of a race.' The eugenical standpoint is that of the agriculturalist who, while recognising the value of culture, believes that permanent advance is to be made only by securing the best 'blood.' Man is an organism—an animal; and the laws of improvement of corn and of race horses hold true for him also. Unless people accept this simple truth and let it influence marriage selection human progress will cease.

"Eugenics has reference to offspring. The success of a marriage from the standpoint of eugenics is measured by the number of disease-resistant, cultivable offspring that comes from it. Happiness or unhappiness of the parents, the principal theme of many novels and the proceedings of divorce courts, has little eugenic significance; for eugenics has to do with traits that are in the blood, the protoplasm."¹

Eugenics is, by its very nature, prophylactic. It seeks to prevent much of the world's sorrow and sin by going back of marriage to the selection of life partners. Eugenics does not teach marriage without love, but it does suggest the Herculean task of commanding love. It believes that love can, amongst normal people at least, be ordered. It is not blind to the fact that mere propinquity decides more love affairs than any one other factor. Couples attending the same college, the same church or mixing in the same social set,

¹ "Heredity in Relation to Eugenics," C. B. Davenport, Henry Holt & Co., New York, p. 1.

by contiguity choose mates they sublimely believe were predestined for them. Let even a confirmed maid and bachelor be thrown together in an isolated companionship for three weeks and the result is almost surely fatal. Young men and women do not fall in love for high and holy reasons but on the most frivolous and flimsy excuses.

The fact is the present method of mate-choosing reaches the limit of human foolishness, as seen in the divorce courts, where (contrary to the last chapter of the best seller) about one in ten American marriages ends; in the countless fragiley maintained homes where bitterness reigns; and worse than all in the misborn children who go to increase our criminal, feeble-minded, insane, crippled, and pauper population.

After all remember that eugenics is interested in marriage only secondarily. [The children are its primary interest. Davenport gives the point of view in these well-chosen sentences:

“To get at the facts it is necessary to study the progeny of human marriages. Now marriage can be and is looked upon from many points of view. In novels, as the climax of human courtship; in law, largely as a union of two lines of property-descent; in society, as fixing a certain status; but in eugenics, which considers its biological aspect, marriage is an experiment in breeding; and the children, in their varied combinations of characters, give the result of the experiment. That marriage should still be only an *experiment* in breeding, while the breeding of many animals and plants has been reduced to a science, is ground for reproach. Surely the human product is superior to that

of poultry; and as we may now predict with precision the characters of the offspring of a particular pair of pedigreed poultry so may it sometime be with man. As we now know how to make almost any desired combination of the characters of guinea-pigs, chickens, wheats, and cottons so may we hope to do with man." ²

In 1904 Sir Francis Galton introduced the word eugenics to the London Sociological Society in his address which proposed the study of race culture. His definition of "Natural Eugenics" was as follows: "The study of agencies under social control that may improve or impair the racial qualities of future generations, either physically or mentally."

First, it includes both physical and mental betterment of the race within its scope. It will be noted that the definition is comprehensive. Secondly, it is optimistic in that it believes improvement is possible. It specifically mentions those forces under "social control."

Eight years after Galton's address the first International Eugenic Congress was held in London. It was composed of noted scientists, statesmen, philanthropists — eminent in politics, education, literature and religion, gathered from six nations of the world. The programme consisted of thirty-two papers followed by discussions covering the widest possible range of eugenic subjects.

To-day eugenics is everywhere. It is discussed seriously and facetiously. It claims the attention of the deepest thinkers and has achieved the supreme popu-

² "Heredity in Relation to Eugenics," Charles B. Davenport, 1911, p. 7.

larity of mention in the comic papers. Evidently it has come to stay. It behooves us as students to consider it as a new factor in social uplift. To-night we will study for a short time just a small phase of the whole subject, namely, the Eugenics of Character making.

PART II

The end of life is character,
The crown of work is worth.

Among all the works of man the greatest is himself. The empires once graced with cities of capital splendour, sleep with the dead bodies of the past. Sublime works of marble lie buried like bones in a graveyard. The columns of Karnac, themselves but the porticoes of more wondrous buildings, are falling one by one. The Sphinx, still rearing its sadly disfigured countenance above the biting sands of the desert; and its companion mysteries, the Pyramids, more primitive and least artistic of all man's architectural work remain with us to-day, but they stand as melancholy monuments to the transiency of man's achievements and not as testimonials of their imperishableness. Empires, cities, dynasties, palaces, works of art,—all are gone.

“The boast of heraldry, the pomp of power
And all that beauty, all that wealth e'er gave
Await alike the inevitable hour
The paths of glory lead but to the grave.”

Man's work disappears but he himself endures.

Granting that Character is this supremely valuable asset, can it be bred? Eugenics says it can and undertakes to tell us how to do it.

Is eugenics asking something possible? Or, is it urging us to pursue will-o'-the-wisps that will eventually lead us lost and helpless in the bogs of mechanical evolution? Or, asking us to fly after transcendental vagaries that will vanish in the attenuated ether of super-experiential nothings? Either end would be a calamity. Before embarking then so lightly upon the quest of a new race by the road of reason, let us examine our chances of success.

If we adopt certain definitions of character, we are defeated at the outset.* If character is that non-material, detached spiritual entity ruling over and directing all our acts yet itself unchanging and unchangeable, it cannot be bred. Consciously or unconsciously many hold such a view. Emerson is the great exponent of it. Out of the sublimated elements of pure abstraction, he gathers his notion of this unknowable and impalpable thing, and like a sculptor, embodies it in material form and sets it before his readers.

“This is that which we call character — a reserve force which acts directly by presence and without means. It is conceived of as a certain undemonstrable force, a Familiar or Genius, by whose impulses the man is guided, but whose counsels he cannot impart; which is company for him so that such are often solitary, but can entertain themselves very well alone. The purest literary talent appears at one time great, at another time small, but character is of a stellar and undiminishable greatness. What others affect by talent or by elo-

* NOTE.—This discussion of character is taken from the author's *Principles of Character-Making*.

quence, this man accomplishes by some magnetism. Half his strength he put forth. His victories are by demonstration of superiority and not by crossing of bayonets. He conquers because his arrival alters the face of affairs. 'O, Iole! How did you know that Hercules was a god?' 'Because,' answered Iole, 'I was content the moment my eyes fell upon him. When I beheld Theseus I desired that I might see him offer battle, or at least guide his horses in a chariot race; but Hercules did not wait for contest; he conquered whether he stood, or walked, or sat, or whatever thing he did.' Man, ordinarily a pendant to events, only half attached and that awkwardly, to the world he lives in, in these examples appears to share the life of things, and to be an expression of the same laws which control the tides and the sun, numbers and quantities."³

You will note, when your enthusiasm for the exalted, kindled by the cumulative power of fine phrasing, has cooled to calm and practical analysis that the man of "character" owes what he is to a "Familiar" a "Genius" a Greek "daimon" or demon. All that is splendid, and some heroes of history, like Socrates, who felt himself possessed by such a spirit, may have owed all their effect to that kind of spiritual essence embodied in their otherwise quite ordinary beings. But we are dealing with the transmission of traits in Johnny Joneses and Mary Smiths, who in all probability would not recognise a "daimon" if they met it anywhere, much less possess one in all their humble lives. Hence while we find no fault with the inspiring

³ Emerson's "Essay on Character."

message of the New England prophet, we are not able to use it for throwing any light on the hereditary transmission of character.

A step removed from this transcendental idea, but equally impossible to reduce to the reign of law, is the "being" contrasted with the "doing," so comforting to poets especially. Lowell voices the pith of that idealism in his lines:

"The thing we long for that we are
For one transcendent moment."

Such transcendent moments Browning extends and exalts above the vicissitudes of time and space,—

"What I aspired to be,
And was not comforts me,"—

and fixes forever the longing, if not in the character of earthly generations, then in some other world,—

"All that is at all,
Lasts ever past recall.
Earth changes, but thy soul and God stand sure.
What entered into thee
That was and is and ever shall be."

While such aspirations do not transcend human experience as Emerson's character does, they still are contrasted in Browning's mind with their baser and more vulgar supplements, external actions.

"Not on the vulgar mass
Called work must sentence pass,
Things done that took the eye and had the price,
O'er which from level stand
The low world laid its hand,
Found straightway to its mind, could value in a trice."

Such noble stanzas as these must arouse in the reader's breast the truest motives to endeavour. Every word rings with encouragement. Not one good resolution is to be lost. The remotest and most obscure emotion toward the vaguest virtuous act must forever work its beneficent will. "Think finely," is its message, "if that is all you can do. Dream noble dreams, though the will is ever too weak to translate them into acts. Fear not; they cannot be lost. All are gathered up into that permanent matrix of spiritual life called 'character' and abide there forever safe."

Yet there is another mood, less poetical perhaps, and we confess humbly, less inspired, but much more everyday and usable; a mood that calls in stentorian tones for a translation of high purposes into acts. Character, after all, if it does but dream noble dreams lacks something. The gossamer threads of the loftiest idealism will not sustain the weight of daily living. "Do or die," comes as a mandate of the real world. "You cannot dream yourself into character," says Froude, "you must forge and hammer yourself into one." And the forging and the hammering is just that "vulgar mass called work" upon which the world is so eager to lay its hand.

So almost reluctantly we turn away from the poets with their assurance of the eternity of our dreams, and even from our transcendental philosopher and his "Thinking is living" to that sternly morose but, after all, common-sense Scotchman, Carlyle, with his strident call to the calloused duties of this world. "Know thy work and do it," he cries, and when he thinks of these speculating Greeks, his Scotch temper gets the better

of him, and he adds vindictively, " ' Know thyself ' : long enough has that poor self of thine tormented thee ; . . . think it not thy business, this of knowing thyself ; thou art an unknowable individual ; know what thou canst work at ; and work at it like Hercules ! That will be a better plan . " . . . And then having relieved himself by this ebullition, he brings us close to our subject by telling us how he thinks character is made. " Consider how even the meanest sort of labour, the whole soul of man is composed into a kind of real harmony the instant he sets himself to work. . . . The man is now a man. . . . Labour is life . " ⁴

Which shall it be ? Which shall it be ? Doing or dreaming ? The outer or the inner ? In which shall we find the essence of true character ? Well, I suspect that it resides wholly in neither, and that the epigrammatic finality of the apostle of work is as far wrong one way as the dreaming *dolce far niente* of the poet is the other. True character must be formed in a just and righteous balance between these two tendencies.

Character, then, is not body, nor physical perfections. Neither is it all mind in the sense of intellect. Neither is it mere emotion, nor soul, though it may possess both. Nor yet is it " strength of will " which is merely one of its attributes, possibly a necessary one. It is all of these and yet more, for it is composed of all these elements mixed and mingled in a single individual in due and balanced proportions.

Character must be as broad and as inclusive as the idea of full and rounded manhood or womanhood, as objective as a man or a woman, as non-metaphysical as

⁴ Thomas Carlyle, " Past and Present . "

the phenomena of biology and psychology, and as possible of achievement as the objects of ethics or pedagogy. With this appreciation of our needs, and with some knowledge of the impossibility of fully defining character, we offer this working definition: *Character is the total customary reaction of an individual to his environment.* By total we mean to include all he is internally and externally, his dreaming, his doing, and his being; by customary we emphasise the usual, habitual nature of the reactions constituting his character; and by reactions we seek to limit his character to those processes, physiological and psychological, which are aroused by stimuli from his environment, and which are open to observation.

With this broad definition of character as those total reactions, or total traits of an individual, I feel sure that nobody need quarrel. In fact, it is exactly what the every-day man means by it. Let us look at it an instant from his point of view.

Grant for a moment that character must and does imply an independent, self-existent, imperishable spiritual entity connected with each human being. Very well, who is concerned about that abstraction? Nobody, really. What everybody is anxious about is how the man Jones re-acts inside and out to circumstances. When he presents a "character" to an employer, for instance, the paper tells what he has done, does now and is likely to do. His employer wants to know — not his transcendental *character* — but how he re-acts to the beginning whistle, to a novel piece of work, or an extra pile of correspondence; whether these give him a headache, or backache, or periods of peevishness, or

act as stimuli to tap new sources of energy and make him buckle down to work with extraordinary vigour. Habitual re-actions—fits of temper, blues, good-humour, attention to duties, regularity, seriousness or frivolity, energy or slothfulness, lying, stealing, cheating drinking, gambling, courtesy, and a thousand-and-one other so-called *expressions of character*—are what the great public is interested in and what bring the individual into harmony or into discord with his environment.

In all these, not the mythical substratum, but the customariness of the acts is what is final in the last analysis. What we mean when we say "a man has character" is either that he *does* act so and so, or that he *will* act so and so, and we predict his future actions by the regularity or customariness of his past actions under similar conditions. Whether he really has some spiritual substratum determining his future action or not, is entirely immaterial. The fact that he *has done* predicts that he *will do*. *What* he has done presages *what* he will do. This is really all that is ordinarily and necessarily involved in the common usage of the word character. This notion of character ought to appeal to the practical man. Unlike the poet he is not so much interested in what "enters into a man" as what comes out of the man in the shape of work. He asks, "What is a man worth?" meaning the man's cash value in productivity measured by dollars and cents.

Now, to measure the standard of all measures is manifestly impossible. But, still a man's earning power tells somewhat his worth to himself. Dr. Farr

of London tried to find the worth of an average English working man. He calculated the cost of his maintenance in babyhood and old age and his earning power as boy and man, and found the average English working man was worth just twenty-five dollars net. He concluded that it would pay England a million times over to import first class babies instead of raising middle class babies. Yankee conceit is sure we could furnish the babies. No American mother would mark down her child to twenty-five dollars. Most parents would not take a fortune for theirs. They are like the father who, when asked about his twelfth born said "I would not take a million for this one,—nor give ten cents for another just like it!"

If an American has only character enough to make a *wage earner*, according to the Census Bureau, he earns \$518.00 a year. If his character is strong enough to make him a salaried man, he earns \$1187, more than twice as much. The average man works thirty years. The wage-earner is worth to himself \$15,540 for a life time, the salaried man \$33,610. Character counts.

The loss to the nation in loss of character in its citizens is well presented in Captain Hobson's temperance lecture. He estimates that alcoholic drinking—just one trait in character—costs this nation 21 per cent. of its efficiency. A sober man is worth \$8000 a year. The 700,000 cut off by drink every year cost us \$5,600,000,000. Those killed and those weakened in character by alcoholic drinking last year cost this nation the unbelievable sum of \$14,000,000,000. Instead of producing \$32,000,000,000 of wealth this nation, with

character unaffected by drink, would produce yearly \$46,000,000,000. Character, then, in cold dollars and cents pays. It pays the individual and the nation to develop strong, sober, industrious and efficient characters in its men and women.

If character means this perfectly plain and common sense kind of conduct — and I am sure it does — most certainly it can be bred. If organs and peculiarities of organs can be transmitted from generation to generation then the reactions or functions of, and consequent feelings from those organs can be transmitted. At least, no one can *a priori* deny such possibility. Therefore, not only bodily traits but their complements, mental and moral attributes, are legitimate subjects for eugenic research. They ought to be bred. The good ones ought to pass from generation to generation as organic heritages for surpassing in value the tawdry things of material possessions, and every intelligent man and woman ought to be as much interested in laying up treasures of spiritual wealth in their off-spring as they are of dowering them with silver and gold.

PART III

To many people there appears to be no fixed relation between the parents and the characters of their children. Good sons and good daughters or bad sons and bad daughters seem, in the minds of the masses, to come and go without law. Every one is ready on the instant to point out examples of bad children sprung from the best of parents, and with equal readiness to point out good children sprung from the worst parents.

They will tell you that blood does not count, that ancestry determines nothing, that training has little effect. The whole matter of rearing children is guess work. Chance, or Providence, or Fate determines the outcome. That good sons and good daughters, fair in form, noble in bearing, strong in intellect, can be born and bred with the certainty of a tree bearing fruit after its own kind, never occurs to the average parent.

Yet the sources of human character are not remote or numerous. All character is inherited or acquired; that is, it comes from ancestors or environment. "Students of biography," says Henry Drummond, "will observe that in all well-written 'Lives' attention is concentrated for the first few chapters upon two points. We are first introduced to the family to which the subject of memoir belonged. The grandparents, or even the more remote ancestors, are briefly sketched and their chief characteristics brought prominently into view. Then the parents themselves are photographed in detail. Their appearance and physique, their character, their disposition, their mental qualities, are set before us in a critical analysis. And finally we are asked to observe how much the father and the mother respectively have transmitted of their peculiar nature to their offspring. How faithfully the ancestral lines have met in the latest product, how mysteriously the joint characteristics of body and mind have blended, and how unexpected, yet how entirely natural, a recombination is the result—these points are elaborated with cumulative effect until we realise at last how little we are dealing with an independent unit, how much

with a survival and reorganisation of what seemed buried in the grave.”⁵

“In the second place,” he goes on to say, “we are invited to examine more external influences — schools and schoolmasters, neighbours, home, pecuniary circumstances, scenery, and, by and by, the religious and political atmosphere of the time. These also we are assured have played their part in making the individual what he is. We can estimate these early influences in any particular case with but small imagination if we fail to see how powerfully they also have moulded mind and character, and in what subtle ways they have determined the course of the future life.” . . . “Thus what Biography describes as parental influences, Biology would speak of as Heredity; and all that is involved in the second factor — the action of external circumstances and surroundings — the naturalist would include under the single term Environment. These two, Heredity and Environment, are the master-influences of the organic world. These have made all of us what we are. These forces are still ceaselessly playing upon all our lives. And he who truly understands these influences; he who has decided how much to allow each; he who can regulate new forces as they arise, or adjust them to old, so directing them as at one moment to make them co-operate, at another to counteract one another, understands the rationale of personal development.”⁶

Which one of these factors is the more important in

⁵ “Natural Law in the Spiritual World,” Henry Drummond, pp. 253-254.

⁶ “Natural Law in the Spiritual World,” Henry Drummond, pp. 253-54-55.

its effect has been endlessly argued. It is as hard to settle as to decide which wing of a bird is the more important for flying. Both are essential. Both are always present in a growing organism. "The fertilised egg-cell," says Thomson, "implicitly contains, in some way we cannot image, the potentiality of a living creature. . . . If this rudiment is to be realised, there must be an appropriate environment. . . . Surrounding influences . . . begin to play upon the developing germ, and without these influences the inheritance could not be expressed, the potentialities could not be realised. Thus the organic inheritance implies an environment, apart from which it means nothing and can achieve nothing."⁷

Of these two powerful factors moulding the destinies of men, eugenics emphasises the hereditary. It insists first that born-character is at least as important as acquired character, and second, that born-character is not left in the hands of an inscrutable Providence nor an arbitrary Fate. Laws, fairly orderly, and possible to be known, control the hereditary transmission of traits that blend themselves together for the making of a new creature. How these laws operate upon the primitive bits of germinal protoplasm, how chromosomes seem to convey and mingle paternal and maternal characteristics, and how, down among the ids and determinants of Weismann are balanced the spiritual traits of men unborn, is one of the most absorbingly fascinating studies in modern biology. Time compels us to pass these studies by and devote ourselves to the consideration of their gross

⁷ J. Arthur Thomson, "Heredity," 1909, p. 6.

effects as exhibited in the first great law of heredity: Like begets like, or more accurately expressed; Like tends to beget like.

Familiar as this expression is, it still needs emphasis and enforcement upon the consciousness of people. Its operation could be illustrated by hundreds of examples taken from the commonest traits of men. Upon two classes of human defects I will draw; first, because they concern human character most closely; and secondly, because the examples are so striking they will be remembered. The first class of defects is feeble mindedness and the second is moral imbecility.

Yet striking examples of biologic law as these defects are, parents, actual and prospective, will persist in believing that such inflictions are Providential or accidental. Even among physicians the truth was not fully accepted until recently. Expert opinion is now overwhelmingly on the side of the theory that feeble-mindedness in all its degrees, blighting and perverting the minds of children from birth, is an infliction from parents who never should have been permitted to bear such mentally misshapen creatures. Providence is no more to blame here than for the over-growth of weeds in a lazy farmer's field; or for the pestilential bacteria in the lungs of slum dwellers. Society, blind, ignorant, selfish society, permitting its own endangerment for temporary ease, is to be blamed. For these things are not accidental and unavoidable, but hereditary and predictable. Hear the testimony of the Royal Commission on the subject. "Among thirty-five witnesses (besides many others who have merely touched on the subject) who have expressed opinions on the part played

by heredity in the production of mentally defective individuals, twenty-five attach supreme importance to the fact that in a very large proportion of cases of mental defect there is a history of mental defect in the parents or near ancestors. . . .

“ Professor Sir T. Clifford Allbutt, says: ‘ I regard feeble-mindedness (if not accidental) as always hereditary, or in other words, it is a ratio of variation. I have never met with a case of manufactured feeble-mindedness apart from some accident either at birth or afterwards. . . . ’

“ Dr. Ashby says that ‘ in at least 75 per cent. of the children with amentia that I have examined there was a strong possibility that the amentia was hereditary and primary (i.e., spontaneous — not due to external influences). ’

“ Dr. Bevin Lewis regards heredity in the strict sense as playing a very large part in the causation of feeble-mindedness: ‘ There is no doubt of it in my mind. I look upon feeble-mindedness as a germinal variation just as all “ variations ” are. ’

“ Dr. Tredgold, from an extensive study of the antecedents of mental defectiveness, states that over 80 per cent. of the cases are connected with neuropathic inheritance, the remainder being due, in his opinion, to causes such as alcoholism and tuberculosis incident on the parents; or to other influences affecting the children themselves. He has never seen a normal child born of two feeble-minded persons.”

These statements can be further buttressed and specialised by statistics gathered in institutions by unbiased specialists. Three great classes of mental defects

stand out conspicuously as fore-runners of imbecility in children. One is epilepsy. Remembering that epilepsy appears in innumerable forms; as spells, fits, spasms, and regular nervous attacks, and that the patients are frequently highly intellectual, talented, brilliant and attractive, we see that the eugenic warning against this class is especially needed. Writers vary in their estimates of its frequency as a hereditary cause of feeble-mindedness in children. The lowest, 3.02 per cent., is given by Dr. Barr, who looks upon it as a symptom of other causes; and the highest, 50 per cent., by Hall. One family history published by the New Jersey School for Feeble-minded at Vineland, is all that time permits me to quote though literature is full of such histories. An epileptic mother with six feeble-minded brothers and sisters married a normal man with an insane mother. Fourteen children were born. Listen to the terrible catalogue: one was still-born, one insane, five neurotic and seven feeble-minded; not a whole or wholesome human being in that prolific nest. What appears here with such extremity of force, can appear in a lesser degree in any marriage tainted on either side with any kind of epilepsy, no matter how much wealth, beauty, culture or refinement may christen it the disease with a euphemistic name.

Insanity in any form is another cause of imbecility. The percentage varies from 7 per cent. to 42 per cent. Dr. Barr mentions one family of 173 persons, 26 of whom are pronounced neurotics, 9 are insane, 3 are imbecile, 10 were still-born; in all 50 abnormal descendants, whose abnormalities can be traced to one insane man. Who would venture to assert that this man's

bride ever dreamed of becoming the mother of such an awful brood?

When we come to the third cause of feeble-mindedness, namely, feeble-mindedness itself, there is practically no doubt of its power to work harm. The percentages run all the way from Dr. Barr's 27.38 per cent. through Dr. Tregold's 80 per cent. to the 100 per cent. of some experts already quoted on the Royal Commission. We can afford to be conservative. One-half of our children, or one-quarter, yes, even one,—feeble-minded, is enough to cloud like a hanging pall all the happiness we will ever get out of married life. The facts can be stated tersely. Two feeble-minded parents never produce normal children. High grade, or very light feeble-mindedness, combined with other weakness, may produce imbecility and idiocy of low degree. This is almost sure to happen when a feeble-minded person marries a tubercular or alcoholic mate. One feeble-minded in about every 300 of population, or about 300,000, is the estimate for America. Dr. Barr tells of three families with three imbeciles each; two, with five each; one with four; one man with nineteen defective children, another with twelve; three generations defective — the grandmother, feeble-minded; mother, epileptic; father, a shiftless vagabond unable to provide for seven imbecile children; another family, all imbecile.

During an experience of four years in the Psychological Clinic at the University of Pennsylvania, I had the opportunity of seeing some of the dead statistics take on life and stalk forth in living horror. I saw a feeble-minded pauper girl, whose brother is in Spring

City, feeble-minded, and whose infant brother died an idiot, whose mother is in a Blockley Insane ward and whose father is a feeble-minded tinker; an Italian and his wife bringing in one day two idiots out of five children; a feeble-minded boy whose father, himself probably feeble-minded, was once a legislator in a certain State; the president of a college with his feeble-minded daughter; the rich and poor, the learned and the ignorant, the good and the bad with their forlorn and defective children, all shadowed with the same pall of eugenic ignorance.

I have seen a grey-haired mother, when told that her son upon whom she depended was a hopeless imbecile, totter and fall like a stricken tree, and tremble from head to foot with broken sobs. There was insanity in her family but nobody had told her that she should not marry. Good people might have feared to break her young heart. A thousandfold better would it have been to have suffered the broken heart at sixteen while life was plastic than to have the awful blow fall at fifty when the storms of life had weakened the heart and will and when old age began to depend upon the strong arm of the son that this day is in a state asylum for idiots. It is high time that the outspoken statement was made that mere sentimental attachment, largely a thing of instinct, is not enough basis for a happy marriage; love is not the lofty, fixed and immutable thing novelists tell us it is, but changeable like every other instinct,—accidental, flighty, fitful, flitting; that it does not possess natural and inalienable rights above reason and common-sense but is thoroughly amenable to laws of development and can and ought to be

cultivated, suppressed and deflected like a vine upon a trellis. With neurotics and erotics, love may be supreme, but with common-sense people, it obeys law.

Now, I've said enough to be thoroughly despised by the poets and by the young person in love for the first time, but I trust the rest of you will take the matter seriously. It is a subject almost always too lightly treated, even when the treatment resolves the audience into tears. Falling in love is at least as serious a step as crossing a railroad track. There you are bidden to "Stop, look and listen." That you should do here. Then if you must, fall in love, but for heaven's sake, see more in the young lady than a *retroussé* nose and a lisp, or in the young man, than a cow-lick and a smooth knobbed cane. You may think that you can marry the nose and the lisp, or the cow-lick and the cane alone but unfortunately you can not. The woman or the man is thrown in with the bargain. You have to live with one or the other.

That, however, is not the whole calamity. You can't marry a *retroussé* nose without marrying the girl *and* her father and mother, and grandfathers and grandmothers and all her uncles and her cousins and her aunts in the jail, the poor house, the asylum, and the graveyard. If you smile at that now, some day you may bitterly rue your smile when you see in your child some weakness or waywardness that you can trace to your wife's relations with the fatality of cause and effect.

Marriage possesses so few possibilities for the universally expected foolish happiness, so many possibilities of untold woe, and so many potentialities for the

largest, strongest, tenderest life two people can live on earth that it deserves the sincerest consideration possible to be given it.

So closely allied to feeble-mindedness that many experts insist that it cannot occur without its mental cognate, stands moral imbecility. Here we enter upon a real study of character by heredity. Moral obliquity must affect character whether we believe nervous derangements, or mental aberrations do or not. In the words of the Royal Commission, quoted by Dr. Tredgold, "The moral imbecile is a person who by reason of arrested development or disease of the brain dating from birth or early years displays at an early age vicious or criminal propensities which are of an incorrigible or unusual nature, and are generally associated with some slight limitation of intellect."⁸

Whether such a disease existed or not was a matter of long dispute, but writers like Rush, Pinel, Prichard, Maudsley, Tuke, Kerr, Suttleworth, Ireland, Berkley, Barr, Tredgold, Lombroso, Ferri, and the Royal Commission experts have set the question of its existence at rest.

Little doubt seems now to exist that the moral imbecile is a type as distinctive as the mental imbecile and both are defective from birth. The moral imbecile may be deficient either in moral sense, meaning by that he cannot intuitively distinguish between right and wrong; or, he may not have mental power enough to choose the right means to a known ethical end; or, lastly, he may so lack certain social impulses or possess

⁸ "Report of the Royal Commission on the Care and Control of the Feeble-minded," Vol. VIII, 1908, p. 189.

such over-developed selfish impulses that he cannot by the utmost training be made fit for modern society. He was born defective, as defective as if he lacked arms or legs or was possessed of an enormous head. Education can no more remedy his moral defects than it can put on arms or reduce hydrocephalic craniums. Such unfortunates crave the excitement of wrong doing. That is their supremest pleasure. They feel no pains of conscience. Their intelligence is too limited to make the thought of consequences vivid. Such a boy at Vineland, New Jersey helped to build a hay barn; then stole matches, waited his chance, set the barn on fire, saw that it had a good start, then gave the alarm, and assisted in the fruitless endeavours made to save the building. All this he did "just to see a blaze." Dr. Barr tells of another boy adopted by a well-to-do couple, taken with the boy's fine appearance, who treated him as their son. He promptly repaid their kindness by burning down their mill and reducing all of them, himself included, to poverty. Dr. Tredgold mentions the extreme case of the moral idiot who decapitated a sleeping man to see what he would do when he waked up.

Not only do the acts of the imbeciles possess a certain character of moral irresponsibility, but according to many writers, the persons themselves are, Cainlike, marked out from the rest of mankind by physical stigmata. This was the especial emphasis of Lombroso and his famous school. With him the moral imbecile became the born criminal, one born for evil and marked from birth with the signs of his predestined trade upon him. "In general," he says, "low criminals have pro-

jecting ears, thick hair, a thin beard, projecting frontal eminences, large cheek bones and frequent gesticulation." The theory was carried so far that even different kinds of criminals were to be distinguished by their physical traits. Thus thieves have mobile features, eyes and hands, thick, close eyebrows, crooked noses, thin beards, receding foreheads, pale yellowish complexions, and cannot blush. Some incendiaries have a peculiarly delicate skin, an infantile aspect, and an abundance of hair, sometimes resembling a woman's. All these peculiarities apply, of course, to the Italian nation.

Recently a decided reaction has set in against the extremes of Lombroso's views, though it is still accepted in substance by many anthropologists. There is a born criminal, a being brought into the world to do violence, to spend his time hunting, hunted or trapped behind prison bars. More than that his type is so fairly well marked that his physical characteristics plus his early-developing and persistent career in crime, make him unmistakable. And finally, what is more important to the eugenicist, since the man is a *born* criminal, he has the fatal power of transmitting his moral birth-marks to his posterity. Let it be remembered that we are not now discussing the ordinary bad boy, nor the "degenerate" man, nor the habitual criminal, all of whom may be products solely of environment. We are discussing the moral imbecile, the "born criminal," the fated unfortunate, upon whom more unfortunate parents have wrought their work and then too late for any improvement have turned him over to long-suffer-

ing society. In the existence of such beings and in their beneficent extermination every intelligent citizen should have the liveliest interest.

Statistics on moral imbecility vary. This is due to the fact that penal institutions do not distinguish between born-criminals and other criminals. Of course, the prevalence of crime through several generations of the same family argues and argues strongly, for hereditary transmission of criminal tendencies, especially if the persistence of crime occurs in a community otherwise fairly good. However, this cannot always be assured and the figures must be accepted more to establish the gruesome fact that crime breeds crime, rather than an accurate measure of how much crime crime breeds.

Lombroso himself, in 1871-72 studied 2800 criminals, 7.4 per cent. with drunken parentage. Virgilio found a criminal parentage of 26.8 per cent. of his criminals. Mettray found that out of 3580 criminals 707 were children of prisoners and 308 of persons living in unlawful relations.¹⁰ Probably Travis has made the most definite effort to estimate the percentage of born criminals among ordinary institutional inmates. He made widespread researches both in America and abroad and has no disposition whatever to magnify the influence of heredity over other factors.

He sums up his figures for several institutions as follows: ¹¹

¹⁰ "Twentieth Century Practice of Medicine," Vol. XII, pp. 406-407.

¹¹ Thomas Travis "The Young Malefactor," 1908, p. 9.

Place	Nat. Abnormal	Nat. Criminal
Elmira Reformatory, N. Y.....	18 per cent.	9 per cent.
Caldwell Penitentiary, N. Y... }	15 per cent.	7.5 per cent.
Rahway Refuge, N. Y..... }		
House of Refuge, N. Y..... }		
N. Y. Juvenile Asylum.....	8.7 per cent.	2.9 per cent.
Juvenile Court Offenders.....	2.0 per cent.	1.0 per cent.

These figures are probably more conservative than otherwise, and for that very reason gather power when applied to population masses.

But let us vary this grey and melancholy waste of figures with one or two scarlet illuminations. The Jukes and the Ishmaelites, and more recently the Nams, appear as families of hereditary criminals wherever literature on the subject appears. Their general history is much alike. All spring from worthless parent-stock. They lived apart, largely segregated by locality or by choice from the rest of men; intermarried and inter-bred until they developed into colonies or tribes of degenerates of every variety.

The Jukes will give us the best idea of what may happen when the law of heredity combines with environment in the promotion of crime. "From one lazy vagabond nicknamed 'Jukes,' born in 1720, whose two sons married five degenerate sisters, six generations numbering about 1200 persons of every grade of idleness, viciousness, lewdness, pauperism, disease, idiocy, insanity and criminality were traced. Of the total seven generations, 300 died in infancy (and one can say it devoutly with a 'Thank God!'): 310 were professional paupers, kept in alms houses at total of 2300 years; 440 were physically wrecked by their own 'dis-

eased wickedness'; more than half the women fell into prostitution; 130 were convicted criminals; 60 were thieves; 7 were murderers; only 20 learned a trade, 10 of these in State Prison, and all at a state cost of over \$1,250,000."¹²

One compacted summary like that cannot for a moment give an adequate impression of the ghastly corruption into which this intertwined colony of degenerates fell. A few segregated and magnified germs are interesting objects of agreeable study but a colony of the same germs becomes a horrifying mass of cancerous corruption. So figures of crime often convey less of the motive power to sane action than one concrete example coming straight home. May such an example never come to any of you. May your heart never be burdened with a son or daughter hopelessly bad.

Here let us pause to say we are not talking about mere badness, no matter how exasperating or vicious that badness may be. Mere badness in a child is always palliated in the parents' mind by the thought of its transiency. "Johnny is too young to understand," "He will learn better," "He will do better when he grows older," "Give him another chance," "While there's life, there's hope," are all formulæ of cheer in the most heartwringing moments of fathers' and mothers' lives when children go wrong. What stays are they from utter desolation, what tintings of hope seen through agony of tears they paint, let those parents tell who have felt their power. "Hope springs eternal in the human breast" and nowhere more blithely than for an erring son or daughter. But, sup-

¹² Dugdale, "The Jukes," 1878.

pose in the midst of a father's or a mother's anguish for the waywardness of a child, the hard black doom must be pronounced, "He will never do better because he cannot. His mother married a scapegrace, possibly because she fancied a rake, possibly to reform him, and upon her son has fallen the father's moral blight."

Lest the hearer think this situation overdrawn or limited to fanciful pictures of Zola's "Dr. Paschal" or Ibsen's "Ghosts," let me give one incident from real life.

A young woman married a rich man who had escaped from rigid home discipline and sowed his wild oats with a prodigal hand in widely scattered fields. His dissipations did not stop with marriage, but took this opportunity to add new transgressions to the list. The man ran through the whole gamut of vices that eat through a wife's social veneer and let the world stare in upon her bared soul. Her face took on the hopeless look of the bound prisoner. Her woman's heart hunger for happiness suffered to the limit and then died. She neither sorrowed nor rejoiced when the man ran through one last awful debauch and escaped public disgrace by blowing out his poor diseased brains. Then his widow turned wholly to her sons and saw them grow into two physically handsome, sturdy boys, full of life and promise. But, at about twelve years of age, the older began to exhibit the first evidences that his mother had married a rich young man who had led a wild life. The boy shirked study, became disobedient, forsook his rightful companions and sought fellowship with low fellows, black and white, played truant and finally developed an uncon-

trollable habit of stealing money. He himself said that something seemed to make him take it. Needless to say the money went for nothing good.

What will become of this fine-faced lad, I do not know. I hope for the best. This I do know. The wife's grief-deadened soul revived in the infinitely sharper anguish of the mother. She found that fate could wring agony from new chords when old ones ceased to vibrate. She learned that a girl who binds her own life to a man by human laws at the same time binds by infinitely sterner laws beings for whom she would gladly later lay down her wretched life to free. This is the judgment of Life upon men and women who marry only with the thought of their own immediate happiness.

But finally, I would in no wise be true to the high calling of eugenics, if I left you with such a gloomy picture. Eugenics does not only ask you to avoid organically tainted partners. It listens to race-suicide sermons indulgently. It is not interested in preserving a mediocre string of generations filing across the level desert of existence. It aims to improve the race, to raise the standard of productive efficiency, to fill up the measure of happiness for each and having done that dares to believe that that capacity can be indefinitely increased till men become angels and the earth becomes the Kingdom of Heaven.

You see then that eugenics has a bright side. Even so does the Law of Uniformity: Like begets like, cut both ways. Bad comes from bad, but also good comes from good. Galton has shown us in his pioneer works: "Heredity Genius," "English Men of

Science," and "Natural Inheritance," that all brilliancy of intellect does not flash out in one generation and leave the sons of a bright father a little worse than others. Galton found in studying 207 fellows in the Royal Society, all of them men of brains, that they had noteworthy fathers twenty-four times more frequently than would have been true without the law of heredity, noteworthy grandfathers twelve times and worthy brothers thirty-one times. The Autocrat was right in preferring the man with a comfortable line of celebrated ancestors over the self-made man of no parentage. Brains beget brains. Sterling character can be passed on from generation to generation with a little more certainty than entailed estates.

This double-edge of the eugenic sword is revealed most clearly in the recent description of the Kallikak family studied so thoroughly by Dr. Goddard of Vineland, New Jersey. Somewhere back in Revolutionary times, a young man of normal mentality became the father of a child by a feeble-minded girl. From that unfortunate union came 480 known descendants only 46 of whom were known to be normal.

The same young Colonial ancestor of this blackened line later married a normal woman. Note now the impassable gulf fixed between these two lines of children. From the latter pair came 496 known descendants. In all that line no illegitimates, no criminals, no epileptics and no feeble minds are found; while the generations are ornamented with respectable doctors, lawyers, judges, educators, business-men and landowners.

This case is remarkable; for, in a limited way, and as

far as our ordinary social conditions will permit it, it was a controlled experiment. As the environments of the two lines as far as topography, climate and in some instances, home conditions, were the same, it stands as the clearest case of hereditary effect so far studied. It shows admirably and terribly the potentialities for good or for evil residing in one human being and illustrates how these potentialities can be turned to the right or the wrong side by mating.

To show that this is true of goodness and to offset poor suffering humanity incarnated in the Kallikaks and Jukes, let us study the posterity of another bit of human clay, Jonathan Edwards, living and giving life under the same organic laws as the worthless old Max Juke. In his book on "Social Direction of Human Evolution," Kellicott gives a summary of this man's descendants, a crown of glory fit to honour the head of any founder of a royal family. Turn your back for a moment upon the little lake shore of the New York hills and the pitiful huts of the Jukes while you hearken to the roll-call of the heroes. At their head stands Jonathan Edwards, and behind him an array of his descendants numbering in 1900, 1394, "of whom 295 were college graduates; 13 presidents of our greatest colleges; 65 professors in colleges, besides many principals of other important educational institutions; 60 physicians, many of whom were eminent; 100 and more clergymen, missionaries, or theological professors; 75 were officers in the army and navy; 60 prominent authors and writers, by whom 135 books of merit were written and published and 18 important periodicals edited; 33 American States and several foreign coun-

tries, and 92 American cities and many foreign cities have profited by the beneficent influences of their eminent activity; 100 and more were lawyers, of whom one was our most eminent professor of law; 30 were judges; 80 held public office, of whom one was vice-president of the United States; 3 were United States Senators; several were governors, members of Congress, framers of state constitutions, mayors of cities, and ministers of foreign courts; one was president of the Pacific Mail Steamship Company; 15 railroads, many banks, insurance companies, and large industrial enterprises have been indebted to their management. Almost if not every department of social progress and of the public weal has felt the impulse of this healthy and long lived family. It is not known that any one of them was ever convicted of crime." ¹³

When into a home for the first time comes the heavenly visitor, father and mother bend over the little body and scan it from head to foot for some physical defect. Happy are they if the child is physically perfect. It is all that it can be. They are satisfied.

By and by comes the dawning time of intelligence. Faint sparks of the human begin to gleam through the merely physical activities of their precious little animal. Affection, faint-dawning as deceptive morning twilight, begins to show itself and turns maternal duties into joy. Words come. The little mind grapples with sentences. Questions by the hundred pour out of the exploring mind and baby learns a thousand new things a day. Through all this time father and mother have

¹³ "The Social Direction of Human Evolution," Wm. E. Kellicott, pp. 187-188.

watched the growth with anxious hearts, agonising in hope that their child will not be stupid nor defective, but sound and bright. The day comes when a clean-faced six year old swings bravely off to school. Reports come and the family is proud because their boy stands at the head of his class. He is bright, quick, brainy. They're sure he can make his way and begin to plan for college. Then the teens come and the boy begins his real self-making. New impulses rise in him like waves. Most anxiously through those trying days do father and mother pray on bended knees, "O God, make our boy a good man." They can only watch the battle afar, trusting ultimately that the something bred in their boy will at last carry him through and set his feet firmly on the rock of young manhood.

In some way or other the crisis comes. The boy leaves home for college, and they begin to hear from him. His gait becomes steadier. He sticks to his tasks. His grades are good. He enters a first class fraternity. He takes a lead in college activities. He is foremost for clean living, for the square deal, for fair play, for all those activities that raise the standards of college life and help the weaker fellow. He is popular. The President knows him and can rely upon him in all campaigns for strong righteousness. The poor, tempted college fellow knows him too, and slips up to his room at night and slides sheepishly in to the hearty "Come." Commencement Day arrives at last and father and mother, sure that their boy has done fairly, go up to see him graduated. What they see nobody can tell, the little things, the life their boy lives in the open, his visitors,

their easy greetings, their clean faces and evident breeding, the boy's prominent position in everything good, his place on the programme, the frank admiration of the professors and the great words of the discerning president who holds the mother's hand and says, "You ought to be proud and happy. You have a good son." Shall we leave them there, the two heads touched with grey, bowed under the happiest fruitage of age, the knowledge that the boy of their heart is strong and bright and good?

Accidental, is it? Yea, say rather that the glowing story of the orchard-trees in autumn is accidental; that fruits of fall need no spring; that men can harvest without sowing; that figs grow on thistles; that night and day may reverse themselves; that the solid orb may make itself a new path and the planetary heavens declare anarchy, as to relegate the ultimate product of all creation — a good man or good woman to the irresponsible and irresponsible forces of senseless chance.

Man from the dust and woman from the bone —
But oh, we were not wrought of these alone!
God with his heavenly spirit breathed thereon.

VIII

THE EUGENICS MOVEMENT FROM THE STANDPOINT OF SOCIOLOGY

CHARLES A. ELLWOOD

ON May 16, 1904, Sir Francis Galton, cousin of Charles Darwin, delivered a lecture before the newly formed Sociological Society of London, on "Eugenics: Its Definition, Scope and Aims." Defining eugenics as "the science which deals with all influences that improve the inborn qualities of a race," he set forth the desirability of a eugenics programme in human society. The time proved ripe for such an idea. A Eugenics Education Society was soon organised in London and similar movements were started in various parts of the world. Thus was born the eugenics movement, the growth and vitality of which were evidenced last summer (1912) when the First International Eugenics Congress met in London with representatives from nearly all civilised countries.

The idea, of course, was not new. Sir Francis Galton himself had frequently set forth the idea of eugenics in his earlier writings, first using the word in his "Inquiries Into Human Faculty," published in 1883. Indeed, as far back as we can go in the history of man's thought concerning his social life, we find similar ideas. Thus we find a quite fully developed eugenics programme set forth in Plato's "Republic." As to modern movements in a similar direction it should not

be forgotten that in the United States, for a generation or more, many social and philanthropic workers have advocated the permanent segregation of the hopelessly defective classes, which is of course a negative eugenics programme.

The sociologist sees much to commend in this eugenics movement, even though like all new movements it may have its cranks and extremists. From a sociological standpoint, the eugenics movement is to be commended, in the first place, because it calls attention to the great importance of the factor of heredity in human social life. Heredity is a factor which has too often been overlooked in the past by social thinkers and leaders. The advance of modern science, however, makes it more and more evident that the biological factors in man's social life must not be overlooked; and among these factors heredity, or the genetic relation between generations, is of paramount importance.

Again, the eugenics movement is to be commended sociologically because it tends to call attention to the fact that the character of the mass is more or less derived from the character of the individual unit. Some recent sociological thinkers have tended to neglect and even to deny this old truth, asserting that human society can be adequately understood by paying attention simply to its general traits and mass movements. It is safe to say, however, that there is nothing in human society which does not derive ultimately from the biological and psychological nature of the individual. In other words, individual character is the ultimate problem in human society, and this eugenics emphasises

by calling attention to the part which inborn traits play in the formation of the character of the individual.

Finally, the eugenics movement is to be welcomed, from a sociological standpoint, because it throws emphasis upon the importance of marriage and the family as institutions in human society. It teaches that these institutions are central in determining individual character, and so also in determining the general character of our social life. It is the quality of the mating, or the marriage, in other words, which determines the heredity of the child; and so the institution of marriage becomes central in the whole problem of eugenics.

Here it may be remarked that the problem of eugenics is essentially a sociological problem. This Sir Francis Galton himself recognised by his final definition of eugenics as "the study of agencies under social control which may improve or impair the racial qualities of future generations, either physically or mentally." From this definition it is evident that Galton conceived of eugenics as an applied or practical science, resting on biology on the one hand, and on sociology on the other. At any rate, it is evident that as long as the institution of marriage remains in human society the stream of life must flow through this institution. Practically, therefore, the eugenics movement aims at the control of this institution in the interest of improving the racial qualities of future generations. That is, the problem of eugenics in our present social order is simply the problem of securing wise marriages in society,—wise, that is, from the biological standpoint. In order to solve the problems of eugenics, therefore, there

must be a thorough understanding of biology on the one side, and of sociology on the other.

While the sociologist sees much to commend in the eugenics movement, he also sees many dangers and difficulties connected with the movement. The chief danger is perhaps to be found in the over-emphasis of the importance of heredity, and of the biological element generally, in human society. If it has been a mistake of some social thinkers in the past to fail to see the importance of this element, it may easily happen that in the future as great a mistake may be made in the over-emphasis of heredity. Human society is not strictly a biological affair, nor is social evolution the same thing as organic evolution. On the contrary, human society is primarily a psychological matter, and social or cultural evolution is only based on and conditioned by organic evolution. We are not justified, therefore, in taking a strictly biological view of human society. In so far as some of the eugenics literature of the present seems to imply a purely physical view of our social life, it may be discarded as worthless. There is no excuse for the eugenicist overlooking the spiritual factors in our social life. Beside the hereditary or in-born traits of individuals, there are, of course, also acquired traits, or habits. In civilised human society these latter are much more numerous, and, from a moral standpoint, much more important than the in-born or hereditary traits. So far as we know, the in-born traits do not adjust the individual to civilisation or produce high moral character. Civilisation and the more specialised features of individual character, in other words, are acquired traits. Thus both scientific

psychology and sociology show the vast part played in individual and social life by acquired habits; and as yet we have no scientific evidence to show that heredity determines in any hard and fast way what acquired habits the individual shall take on. While inborn qualities or capacities must furnish the basis for the acquired character or habits of the individual, apparently in the normal human individual habits of many varied sorts may be built upon the basis of the inborn traits.

The danger of eugenics, then, is in overlooking the importance of the environment in civilised human society. Yet this danger does not necessarily inhere in the eugenics movement. While eugenics emphasises the inadequacy of all attempts at social reform through paying attention merely to the environment, yet a sanely developed eugenics movement will undoubtedly recognise the inadequacy, from a social standpoint, of paying attention to the factor of heredity alone. In other words, *recognition of the importance of heredity is perfectly compatible with recognition of the importance of nurture or environment.* The stream of life can be polluted in two ways, either at its source, or along its course. While the pollution of life at its source may be more serious than any later pollution, yet the eugenicist, just because of his interest in keeping the spring of life uncorrupted, may well have a more vital interest in the forces in the environment which affect life and character than others. For if such things as alcoholism and disease are to undo his work, what is the profit of attempting it at all? There is nothing, therefore, in rational eugenics which forbids the widest and

most intelligent interest in the things in the environment which affect individual life and character. On the contrary, rational eugenics will make no claim that it is any more than one of many agencies which may be employed for the improvement of human social life.

The practical difficulties which are in the way of carrying out a rational eugenics programme, in human society, are even greater, it must be admitted, than the theoretical dangers which have just been pointed out. Modern civilisation has developed individualism to a high degree, and perhaps nowhere is this individualism seen more than in the relations involved in marriage and the family life. The control of these relations for the advantage of society is a delicate and difficult problem, as yet very far from solution. This, as we have already pointed out, is the real social problem involved in a rational eugenics programme. It would be a great mistake, however, to assert at the beginning that marriage could not be controlled in the interest of a stronger and better race. In all ages and practically among all peoples, as Sir Francis Galton pointed out, the institution of marriage has been subjected to numerous regulations, some of them, even of the most absurd character. If this is true, it must be evident that there is no insuperable difficulty in the way of the regulation of marriage in the interests of eugenics, even in as individualistic a society as our own. The methods of social control over marriage in such a civilisation as ours must, however, be manifestly different from methods of control used in the past. They must be less through the coercion of law and more through the power of education, ideals and public opinion.

The value and limitations of a eugenics programme in modern society must now be evident. Its value consists in its emphasis on the importance of the conservation of our racial stock, to which hitherto we have given less attention than to the preservation of the purity of the breed of our domestic animals. It puts in the forefront of our social problems the problem of securing a good birth, a right start in life, for every child. This is surely a step in the right direction, for the chief purpose of all social institutions is to produce men and women fitted to carry out the great tasks of civilisation, and this they will scarcely be able to do unless they enter into life sound in body and mind. On the other hand, the chief limitations of eugenics lies in the fact already pointed out that social improvement is by no means the same as racial improvement; that the direct action of eugenics is limited to the biological element, whereas social progress is an outcome chiefly of intellectual and moral forces brought to bear on the individual through education and other methods of social control. Another, though temporary, limitation of eugenics is, of course, to be found in the fact that our knowledge of human heredity is as yet far from complete; and that we are even not in agreement, so profoundly do modern ideals of life conflict, as to what are desirable human qualities. We must understand, then, both the laws of heredity and the principles of social welfare before a eugenics programme can become practicable in human society. Assuming, however, that we are in agreement about the desirability of certain fundamental human qualities, such as health, intelligence, energy, and self-control, let us see, without going

into technical details, what light modern biology can give us on the laws of human heredity.

We all understand what heredity is in a general way. We plant seed in the ground, and from it expect a plant of a certain type to be produced. We know that as much depends upon the seed as upon the soil, moisture, temperature and light, the factors in the environment. We do not expect a superior type of cabbage, say, to grow from an inferior kind of seed; neither do we expect the cabbage to grow without the proper conditions of soil, moisture, temperature and cultivation. Now the seed stands for the hereditary elements involved in such a situation. The heredity, in other words, is what is given in the germ, and it is manifest that no attention to environment can possibly develop anything but the potentialities of the germ. Now, the case with human beings is not different from what it is with plants. As in the plant world, so in the human world, heredity is alone creative of individual qualities. The environment can only modify those qualities, though, so far as his behaviour is concerned man is probably the most modifiable of any species.¹ Now if heredity is what is given in the germ, it is evident that *nothing can be inherited except the traits which are inherent in the germ cells*. These cells, out of which the new individual arises, modern biology teaches, are a separate series of cells distinct from and more or less independent of the body cells. Hence, the impossibility of parents transmitting to offspring traits which they have acquired during their lifetime,

¹ Note: Of course in this statement only normal man is referred to. See in general Thomson's "Heredity," pp. 242-249.

for there is no way by which specific modifications in the cells of the body can possibly reproduce themselves in the germ cells. This fact of the nontransmissibility of acquired traits is known as Weissmann's law of the non-inheritance of acquired characters. Though there has been much debate of this law, rightly understood it seems self-evident when we remember that the germ cells are separate and distinct from the body cells. Under such circumstances it is impossible to conceive that a bodily mutilation could be transmitted from parent to offspring; likewise, that a functionally produced modification in the body of the parent organism, could be transmitted. A clear grasp, therefore, of the truth that nothing is inherited except the characteristics of the family stock, the traits which are inherent in the germ plasm itself, will save many questions. Weissmann's law is, however, often misunderstood by people generally to be the doctrine that the life of the parent organism in no way affects the life of the offspring; that no matter what the individual parent does, it will not affect his offspring. This is, of course, a gross misunderstanding of Weissmann's doctrine. Weissmann knew, as well as every one, that the germ cells receive their nutrition from the blood, and hence may possibly be influenced in many ways by the character of that nutrition without there being any transmission of specific bodily modifications. As yet, however, scientific evidence is lacking, as to the amount and character of the influence upon the germ plasm through nutrition. The evidence seems to point mainly in a negative direction, that is, that the germ cells may be influenced by poisons and by mal-nutrition, but prob-

ably not in the opposite direction. Thus, the evidence seems to be fairly sufficient to warrant the conclusion that a large amount of alcohol in the blood, sufficient to poison the whole system, will poison the germ cells and set up degenerative changes in them. The offspring of confirmed alcoholics are, therefore, apt to be under-vitalised or afflicted with various forms of degeneracy, such as feeble-mindedness, epilepsy and insanity. This is, at least, the most conservative, scientific view at the present, though it is still much debated. It will be noted, however, that in this case there has been no inheritance of any specific acquired traits. The poison of alcohol has simply set up degenerative changes which affect the germ cells themselves. It is highly probable that the toxins, elaborated by certain diseases, may produce similar results; certain statistics, at any rate, seem to indicate that to parents in the advanced stages of such a disease as tuberculosis normal children are seldom born. As an example of the effect of mal-nutrition on the germ cells, it is only necessary to say that the mal-nutrition which accompanies advanced age, shows itself especially clearly in this connection. According to Dr. Bertillon of Paris, who has made elaborate investigations along this line, fathers above the age of sixty years, rarely beget perfectly healthy children. Much investigation is, however, still necessary before we can fully decide how far the life history of the parent organism may influence biologically, that is, by heredity, the life of the offspring. It is certain, however, that we are not warranted in assuming that no matter how we live it will not affect the physical constitution and health of our

children. Rather it would seem that the only safe conclusion for the present is that we should live on the highest physical plane, not only for the sake of our own efficiency, but also for the sake of our descendants.

Another fact which should always be remembered in connection with heredity is that inheritance is equal from both parents, but traits are seemingly transmitted as units. This fact gives rise to what is known as Mendel's law, according to which there is no permanent blending of different traits in a series of generations, but on the contrary contrasted traits tend to segregate in definite and regular proportions after the first filial generation. For example if feeble-minded persons intermarry with normal persons, their children in the first generation will be apparently all normal persons.² But if these children of feeble-minded and normal persons intermarry among themselves, their offspring will be found to be one-fourth feeble-minded and three-fourths apparently normal persons. But if these latter intermarry it is found that two-thirds of them will again have offspring in the proportion one-fourth feeble-minded and three-fourths apparently normal, while only one-third will have wholly normal offspring. This shows that in the second generation one-fourth were pure normals, one-fourth feeble-minded, and one-half hybrids which appeared normal, but which were in fact not so, so far as their germ cells were concerned. Mendel's law thus shows us the manner of transmission of hereditary traits in individual cases. It is a highly important law for eugenics, especially

² Assuming, of course, that feeble-mindedness behaves like a simple recessive unit character.

because it shows us the results of the crossing of normal with abnormal stocks. It will be noted that according to Mendel's law, no secure knowledge of heredity can be gained from the observance of just two consecutive generations, but only through the study of three or more generations. In human society, on account of the crossing of numerous stocks, or biotypes, as they are called, practically every mating results in hybrid offspring. Hence the full result of such mating may not be seen until the second, third, or even fourth filial generation.

One further fact should be mentioned in connection with the modern doctrine of heredity, and that is, that apparently merely quantitative variations or fluctuations, as they are termed by biologists, are probably not inherited. Only variations in quality, not in degree, are clearly transmissible. Minute personal traits of the individual, in other words, though they may do much to make personality, are not transmissible, but, as we have said, only the characteristics of the family stock, the traits which are inherent in the germ plasm. These hereditary traits, however, affect every quality of the individual, not only his bodily make-up, but, also, in lesser degree, his mental and moral character.

Perhaps the best study which has yet been made, to illustrate the working of these principles of heredity in human society, is that by Dr. H. H. Goddard, in his work on "The Kallikak Family," recently published. In this work Dr. Goddard shows, in the clearest possible way, the difference between the influence of environment, and the influence of heredity, and, also shows how the particular factor of

feeble-mindedness is transmitted in accordance with Mendel's laws. The book must be regarded as epoch-making in the study of human heredity, because it demonstrates beyond reasonable doubt the very great role which heredity plays in our social life, and, incidentally, therefore, the need of a rational eugenics programme in human society.

For a long time, indeed, there has been no doubt, in the minds of careful students of social conditions, as to the need of artificial selection, or a eugenics programme, in human society. The long cessation of natural selection brought about among certain classes by wealth, unwise charity, and other means, has resulted in the gradual production of an enormous number of hereditary defectives, among practically all civilised peoples. In the United States for example, there are over one-half million mental defectives alone, including in that term not only the feeble-minded, but also the chronic insane and epileptic. In a large majority of these cases, heredity is responsible for their condition. If we add to these mental defectives all those who suffer from serious physical defects, the total number of defective stock in this country can not much fall short of three million persons. Of this number, something over one-half million are cared for in institutions, placing a burden upon the normal population of probably about a hundred million dollars annually. When we consider that the defective persons outside of institutions, are also frequently a burden upon the normal population, we can see the immense financial burden which our defective stock imposes upon our nation, to say nothing of the enormous total burden which must

rest upon the whole family of civilised nations by reason of the existence of a large per cent. of defective individuals in their population. Moreover, when we reflect that a very large per cent. of these defectives are married and become parents, and that the lower types of defectives, especially the feeble-minded, have a much higher birth rate than the normal population, we can readily see that the peril of diffusing throughout our general population the traits of these defective strains is not exaggerated by eugenists. Dr. Goddard's study of "The Kallikak Family" demonstrates this very clearly in a single instance.

What is to be done? As soon as we turn to this practical question, the dangers and difficulties which confront a eugenics programme in human society, become again manifest. Especially is there danger of premature legislation forbidding marriage to certain classes of defectives. The American people are particularly prone to forget what the law can do and what it can not do. There is no reason to suppose that the mere forbidding of legal marriage to certain classes of defectives will prevent their propagation in society, because it is probable that many of these defective individuals will find means of reproducing their kind outside of the marriage bond. Unwise laws, in other words, may not prevent the reproduction of the unfit, but only add to the burden of defectiveness the further burden of illegitimacy. It may be worth our while to pause for a moment to see what the law can do in specific cases, and what it can not do. It is in general a safe principle to lay down that society should not forbid marriage to any class of persons unless it

is prepared to care for that class in institutions segregated from free social life, or, unless it is confident that public conscience and public opinion will be strong enough in its influence over that particular class to prevent even secret infractions of the law. We often hear it said that legal marriage should be forbidden to the insane, the epileptic, and the feeble-minded. This is, of course, a correct theoretical position, but such a law would do little good unless it were backed up by provisions to care for and segregate these classes in institutions. The same remark, of course, applies to criminals and vicious persons; it would do little good to prohibit marriage to these unless provision for their segregation were made. We hear much now-a-days also, of laws to prohibit marriage unless both parties can present a physician's certificate showing reasonable soundness in body and mind. But, again it must be said that the State is not prepared to enforce such a law as yet, because in present society many of the persons who need theoretically such control would be practically least amenable to any form of legal control. On the other hand, while the State is not prepared to enforce such a law as yet, on account of the low condition of public morals, the church, which is supposed to set the standard in ethical conduct, might very well require, it seems to me, of all who come before it and ask for the sanction of religion upon their union, that they present some evidence to show reasonable soundness in body and mind. For how can the church, the institution which stands for ideals in society, give its sanction to a marriage which, according to humanitarian doctrine, is essentially unethical? As a matter of fact,

the Episcopal diocese of the city of Chicago, has already established such regulations for the marriages solemnised by that denomination in that diocese, and they seem to work well.

It must not be supposed from what has been said that eugenic regulation of marriage by law is impossible. All that has been said merely implies that such legal regulation of marriage, for the more defective classes, must be backed up by adequate institutional and other social provisions. Eugenic regulation of marriage for the normal population by law is, of course, entirely possible where there is adequate backing of such laws by public opinion. As examples of such laws, we might instance the laws forbidding marriage between first cousins and other near relatives. Careful investigation seems to show that the warrant for such laws, from a eugenic or biological standpoint, is ample. On account of the fact that many families have slight hereditary defects, cousin marriages multiply the chances of these defects being perpetuated, and even intensified. Hence, statistics show that cousin marriages result in the production of a very much larger percentage of defectives than marriages between persons more distantly related. Again, a law forbidding marriages between widely unlike races, such as the negro and the white race, may be regarded as a eugenic law from the standpoint of the more advanced race. At least until we know more definitely the results of the crossing of races, such laws should be regarded as wise for the present. Other laws of a eugenic character, of course, are possible of enforcement, provided public opinion sufficiently sanctions them. Such a law

for example, would be a wise law restricting the class of immigrants admitted to this country. While it may be very difficult for us to determine by law, for the people who are already here, who shall be permitted to be parents of future Americans, it ought not to be particularly difficult for us to act upon this principle with regard to the admission of our foreign immigrants. While we have immigration laws already which exclude certain dependent and defective classes, in the opinion of experts these laws are relatively ineffective. This is shown, for one thing, by the high percentage of the insane among our foreign born. Dr. C. B. Davenport is of the opinion that an adequate selection could be made among our immigrants to exclude hereditary defectives at comparatively small expense and with comparatively little administrative machinery. He estimates that \$500,000 a year, paid for adequately trained field workers, would keep out effectively all hereditary defectives. If this is so, we might better put a little money into this work which is now being spent for other purposes, as it would save the nation many millions in the long run.

Another legal measure, widely advocated at the present time, in the name of eugenics, is the sterilization of habitual criminals and defectives. Eight or ten States have already passed laws to provide for this, although only one State, Indiana, has as yet had the courage to attempt to put the law into execution. The general opinion of those who have made the most careful study of this measure is that it is a dangerous, or, at least, a questionable law. The sterilization of criminals and defectives does very little to solve the real problems

which those classes occasion in society. On the contrary, such a measure may intensify other evils. Thus, the sterilisation of a feeble-minded woman leaving her at liberty in society, would in no way remove the menace which she is to the community, save it would prevent her becoming the mother of children. The unwisdom of such a half-way measure as this must, therefore, be manifest. Of course, there is no objection to the programme of the sterilization of markedly defective persons if it is accompanied by their segregation in institutions; but in such a case sterilization becomes unnecessary.*

We come, therefore, to the permanent segregation in institutions of the more hopeless types of defectives as the only policy which society can afford to endorse in its war against racial deterioration. The usual objection to this policy, which has been advocated for over a generation by enlightened social workers, is that it is too expensive; that it would imply an enormous multiplication of institutions. The reply is, that while the immediate expense of such a programme of institutional development for defectives might be great, yet it would be a saving to society in the long run, an enormous saving if the principles of eugenics are true. Again, the expense is often exaggerated. Society has already undertaken the permanent segregation of one of these classes, namely, the insane, without any very great expense. The segregation of the feeble-minded would entail, if anything, less expense because many of these individuals can be made largely to support them-

* For a discussion of State sterilization laws see *Bulletin Eugenics Record Office*, 10 and 10b.

selves in properly managed institutions of the farm colony type. It is estimated that there are, at least, 200,000 feeble-minded persons in the United States, a large per cent. of whom should be cared for in institutions. As yet, however, only five States require feeble-minded persons to be committed to institutions just as the insane are committed by public authorities. Provisions for the chronic epileptic class, a very dangerous defective class, are even more deficient. It may be remarked that wherever the policy of segregation has been tried it has proved effective. Thus, in northern Italy in the province of Aosta, there existed for centuries a class of hereditary defectives known as Cretins. These Cretins suffered from a peculiar form of idiocy or imbecility associated with the degeneration of the thyroid gland which was hereditary. For a time, owing to their marriage being encouraged by the church, their numbers greatly increased. In 1890, however, a policy of segregation was adopted, and by 1910 only a single Cretin and three demi-Cretins were left where hundreds had existed before. American society can not enter too soon, therefore, upon this policy of segregation of pronounced defectives. There can be no question, moreover, as to the humanitarian grounds for such a policy, because it has been demonstrated that such defective persons are nearly always happier and better cared for in institutions than they would be outside, and they do not entail future generations with the burden of their defects.

Such is the extent to which the law can go wisely in aiding the eugenics movement. What law can not accomplish, however, can be accomplished oftentimes by

public opinion and public sentiment. Thus, it might be unwise, for example, at the present, either to forbid marriage to or provide for the segregation of certain classes in our population suffering merely from hereditary physical defects. But because these persons are normal mentally we might expect through the pressure of public opinion to bring them to forego marriage and parenthood. Such a class, for example, is the class of congenital or hereditary deaf-mutes. This is a defect which is highly transmissible if persons of this class intermarry. On the other hand, many congenital deaf-mutes are highly intelligent persons. It would seem desirable, neither to segregate this class nor to forbid them legal marriage, but to develop in them, through education and the pressure of public opinion, a eugenic conscience which, under ordinary circumstances, would probably lead the person suffering from such a defect, not to marry. Here, of course, questions may be raised which it is impossible as yet to answer with definiteness. Most hereditary defects behave, as the biologists would say, as recessive characters, that is, they do not appear in the first generation of children when persons having such defects intermarry with the normal population. Therefore, it has been said by some eugenicists that if defective persons would continually marry outside of their defective class, these defects would gradually disappear from the germ plasm, and there would be, therefore, no eugenic objection to such marriages. But the danger of such a doctrine is obvious. There are so many defective stocks in existing society that the chances would be great that some of the children of the first generation who

appeared normal might intermarry with a stock having a similar defect, then the defect would reappear in individuals. In this way defectiveness would be scattered in society rather than eliminated. The safe counsel would, therefore, appear to be that persons having themselves marked physical or mental defects should forego marriage altogether, while persons who come from family stocks in which it is known such defects exist, should be careful to inter-marry only with normal persons. In this case there would be no danger of the defect reappearing in later generations.

Here again it must be said, that much work still remains to be done in the scientific investigation of human heredity, before any hard and fast rules can be made for such cases as we have just discussed. For the present, therefore, the safe policy would seem to be to leave such matters to enlightened individual conscience to decide.

Such, then, is the negative programme of eugenics. It would be a great mistake, however, to think of the eugenics movement as entirely, or even chiefly, negative, aiming simply at the elimination of hereditary defects in human stocks. On the contrary, the founder of the eugenics movement, Sir Francis Galton, himself considered the movement to be primarily positive, aiming at the encouragement of marriage and parenthood among the classes of superior endowments. In his own language "The aim of eugenics is to bring as many influences as can be reasonably employed, to cause the useful classes in the community to contribute *more* than their proportion to the next generation." At the present time the birth rate has fallen greatly

among the socially more fortunate classes, those best fitted to meet the burdens of parenthood, in other words, if not best endowed with ability. The result is that at the present time one-fourth of the married population produce one-half of the next generation, and there is much evidence to show that a large proportion of this prolific one-fourth is made up of individuals of mediocre, if not defective, natural endowments. The problem of positive eugenics becomes, therefore, how society can encourage its better endowed men and women to contribute more than their proportion to the next generation. In other words, how it can encourage marriage and parenthood among the truly better elements of society. Here, again, the eugenics movement is beset by many practical difficulties. It has been suggested that the State, in certain instances, should compensate parents for the birth and rearing of children. It has often been truly said that the mother who bears and rears children is serving the State not less than the soldier who serves upon the battle field. Hence we hear a great deal nowadays about pensions to mothers and mothers' compensation. There can be no doubt, of course, about the service to society of a mother who bears and rears normal children. The only question is whether such a service as this should be compensated in a financial way. Are we going to put every service which individuals render to society upon a monetary basis? Or, are there not some services which we can not pay adequately for with money, and which we should not attempt to pay for with money because it degrades them? Is not parenthood such a service? Would not the women who

would accept compensation for motherhood be the very sort of women whom we might least desire to be mothers? Of course society should not penalise marriage and parenthood on the part of its men and women of ability, through industrial, political or other arrangements, as it doubtless does, to some extent, at the present time. But, on the other hand, society can not safely enter upon any pecuniary method of encouraging marriage and parenthood even among those elements that might meet the test of certain qualifications, because such methods would defeat the very end at which they are aimed.

We, then, must give up for the present, at least, the idea of the encouragement of parenthood in any material way. The whole question, therefore, of positive eugenics reduces itself at once to the question of the ideals of life which we should encourage in the young. It, therefore, becomes primarily a matter of education rather than of legislation. The question involved is evidently that of moral education along the lines of sex, marriage and the family. "The general programme of the eugenist," says Dr. C. B. Davenport, "is to improve the race by inducing young people to make a more reasonable selection of marriage mates, to fall in love intelligently." This means, of course, that young men and women must, even at a very early age, be given right ideals of marriage and parenthood. If they are to make a more reasonable selection of mates, not only must the widest acquaintance between young people be encouraged by society, but they must also be given somewhat different standards of selection than most of them have at the present time. The

ideals of good manners, social popularity, good looks, and wealth, must be replaced with the ideals of health, intellectual ability, and moral character. When these latter qualities come to be put first in the mutual choice of the sexes in marriage, there can be no doubt that the benefit to society will be incalculable. However, something more than the development of right ideals in our young people regarding marriage is necessary for the programme of positive eugenics. That something more is education for parenthood. We hear much of education for good citizenship, but is not a most important part of good citizenship the right fulfilling of the duties and responsibilities of parenthood? By education for parenthood, we mean not so much education in the care and rearing of young children, important as that may be, but, also, instruction of the proper sort along the lines of heredity, sex morality, and the social importance of the family. Hitherto, such education has been mainly left to the family itself, but on account of the fact that many families do not function educationally in this matter, it would seem necessary to introduce, in a wise way, some of this instruction in our public schools, from the kindergarten up. At any rate, there can be no question that some public educational agency must supplement the home along these lines. Of course, the church, as the institution charged with the conservation and propagation of moral ideals in society, is best fitted to be this agency; only the church fails to reach great masses of our population, and as yet is not fully awake to its duties along these lines. Sir Francis Galton's opin-

ion, indeed, was that the eugenics movement could scarcely reach the masses without the development of a eugenic religion. Eugenic religions have already existed, to some extent, in the past, notably Judaism. Christianity, with its doctrine of the love of humanity and the service of man, ought to be especially fitted to aid a rational eugenics programme in modern society. At any rate, eugenics can not succeed without the development of a eugenic conscience, and such a conscience can best be developed in the masses probably through the aid of religious agencies.

In conclusion, then, we must attach a high value to the eugenics movement. Not only has it insisted upon certain vital truths which society can not afford to ignore, but it has brought a great, new hope into the world. When I was an undergraduate, I was told in my course in sociology that heredity was a factor beyond human control; that the most man might aspire to was the control over certain forces in the environment. Such a statement was perhaps justified at the time; but the progress of our scientific knowledge of heredity and the rise of the eugenics movement give grounds for the hope that mankind may yet exercise in some degree a rational control over its own heredity; may, in other words, intelligently modify the qualities of the race itself, rather than leave these to be determined simply by the blind forces of physical nature. Moreover, the whole trend of the eugenics movement is to place marriage and the family upon a much higher basis than it has hitherto been in human society; upon a basis, that is, not of the mere individual happiness

of the married parties, but of service of "the humanity which is to be." The eugenics movement is, therefore, decidedly humanitarian; and if society will heed its message, it will find its life lifted to a higher plane, not only physically, but also mentally and morally.

IX

EUGENICS AND ITS SOCIAL LIMITATIONS

ALBERT G. KELLER

ONE time last year, when the big league season was at its height, and the merits of this and that player or manager were being hotly discussed, some one is said to have asked a Detroit man: "What do you think of this eugenics?" To which was retorted in heat: "Think about Hugh Jennings! Know about him! Well, I guess yes! He's all to the good!" Thus may a great humanitarian plan become confused with the leader of an enterprise of quite another sort.

When a word like "eugenics" gets to be as current as that word now is, it is well for the discreet man to find out just what it means — or better, what it does not mean. A term like that, by reason of being sonorous and of Greek derivation, is likely to attain a vogue that fills the judicious with dismay. "Eugenics" is a mouth-filling word. When a half-educated person utters it, he seems to himself to be saying something — something that hints of stretches of erudition and smacks of vigils of brooding meditation. He falls, as it were, into a hypnotic state, attended by a mood of exaltation and by illusions of grandeur. And a resounding name like "eugenics" (or pragmatism, or pre-Raphaelite) comes to live apart from the thing to which it has been attached, lending to the latter a sort of unearthly pervasiveness, but also not seldom com-

pletely misrepresenting it. It seems to me sometimes that eugenics has come to be used by some people to designate any sort of philanthropic endeavour that may be afoot.

What I am here for to-day is to explain to any one who wishes to hear, what eugenics legitimately and scientifically means. I intend then to suggest to you the nobility of the ideal which it involves (whether it be realisable or not) and to consider the limits and the possibilities attending its realisation, as I see them.

Allow me to approach the question of what eugenics really means, in a somewhat indirect manner. There are few of you who do not know something about the breeding of plants or animals. I doubt if all of you realise how much skill and pains are needful to attain success in it. Let us see what that observer of observers, Charles Darwin, has to say about this matter. Speaking of merino sheep he says that "the sheep are placed on a table and are studied, like a picture by a connoisseur; this is done three times at intervals of months, and the sheep are each time marked and classed, so that the very best may ultimately be selected for breeding." This is no easy task — to select the very best; probably no one here would be fit to pass judgment upon even one of the details that the experience of the breeder has proved to be vital ones. For the breeder is a professional and detects differences absolutely inappreciable by an uneducated eye — differences, says Darwin, "which I for one have vainly attempted to appreciate." "Not one man in a thousand," he goes on, "has accuracy of eye and judgment sufficient to become an eminent breeder. If gifted

with these qualities, and he studies his subject for years, and devotes his lifetime to it with indomitable perseverance, he will succeed, and may make great improvements; if he wants any of these qualities, he will assuredly fail. Few would readily believe in the natural capacity and years of practice requisite to become even a skilful pigeon-fancier."

You can readily see that the skill and care expended upon animal breeding compares very well with that devoted to any other difficult profession, as, for example, surgery and medicine. The same is true in the case of plant breeding. People call Luther Burbank of California, who has done some wonderful work in plant breeding, a wizard — one avaricious man wanted him to cross bees with fireflies, so they could work all night; another complained that he did nothing practical, and wanted him to rear square peas, which would lie in stable equilibrium on the implement used by this man to convey them to their goal. All reports, both grave and gay, about any great plant-breeder, extol in some way the skill and industry put in by him in producing better races of plants.

But what about man-breeding? Are any such skill and industry and study expended upon this enterprise? We are keen about having thoroughbred animals; we want large and juicy fruits and palatable vegetables; but are we demanding human thoroughbreds? Not if our proverbs about marriage being a hit-or-miss affair — a lottery with many blanks — are true. Unless one is optimistic enough to believe that thoughts that "turn lightly to love" are somehow under the domination of some elemental beneficent law, he can not es-

cape the conviction that human mating is, to say the very least, a less scientific matter than the mating of domestic animals by the breeder. "Excepting in the case of man himself," says Darwin, "hardly any one is so ignorant as to allow his worst animals to breed." And men not only allow the worst of their fellows to breed, but, if we are to believe what some critics assert, men permit the progeny of the worst to increase totally in disproportion to that of the "fittest."

Selection, whether done by nature — when it is called natural selection — or by the breeder — when it is called artificial selection — aims to prevent the mating of the unfit and to favour that of the fit. A form of selection which would place the fit at a disadvantage as respects the production of the next generation, is called contra- or counter-selection. It is the survival of the unfit. Now, some of the severest critics assert that counter-selection is rife in human society and that we must work against it. They designate certain counter-selective agencies in our modern life; let us look at these for a moment.

War and the military organisation are taken to form a strong counter-selective factor in a nation's life. Recruits are picked out on the basis of physical superiorities and the defective are rejected. But then these "fitter" men are led out to battle, to be the "food of the bullets," while their less perfect fellows incur no such danger. Even if there is no war, barracks life is shown to be fraught with dangers to health and morals which do not exist in the home. Further, it is said the unfitter get an earlier and better start in their careers, while too often the fitter are delayed in get-

ting on their feet and sometimes handicapped for good and all by a distaste for the sameness and tameness of ordinary life, after the more diverting and irregular military existence. And at the very least, the men who are in military service are obliged to put off marriage, leaving the weaker ones to marry earlier and so have larger families.

Naturally there is another side to all this; war has had and still has important functions in the life of society. I do not intend, however, to balance these cases off; that the military organisation has its counter-selective side — that it leads to the handicapping of the fit to the advantage of the unfit, along the lines I have indicated — can scarcely be denied.

The same is true of the modern economic organisation. In olden times, when a living was got by the chase, he had the best chance who was strongest, or quickest, or most speedy. But now there are many ways of getting on in the world (and so of becoming well-to-do and founding a family) in which physical superiorities are not indispensable. The nearsighted get on; even the blind earn a living,— as masseurs, for example. Wealth sometimes enables a woman to get married and have a family where without it she would stand a vanishing chance of passing on her particular style of non-perfection to future generations. Thus may the less fit prosper over against the more fit.

Again it is shown how celibacy, deferred marriage, and the deliberate limitation of offspring preponderate in those classes which stand highest in the social scale. Demonstrations of these points include tables showing that lateness of marriage and number of children to

a marriage so vary with position in society that we seem to be breeding from our lowest strata.

Yet again the triumphs of surgery and medicine may tend to preserve the physically unsound until they can reproduce their kind, thus handing down a heritage of weakness and disease. The unfit are not allowed to die, as under nature, carrying with them their defects and insufficiencies. It is fair to say that no one, so far as I know, has proposed to kill off the defective; but not a few object to having them breed.

Finally, an emotional and unreflecting benevolence is responsible for a great deal of counter-selection. The struggle is eased for the weak at the expense of the strong; the latter are taxed to provide for the former, and by just the amount of resources of which the strong are relieved are they handicapped in favour of the less fit. Then the latter are enabled to provide coming generations with a burden of the unfit: the imbeciles, criminals, and other defectives. You can not run a prison or an asylum on nothing; but who pays? It is too often the hardworking, self-respecting man of moderate means, who can ill afford it. It is the pennies of the poor rather than the dollars of the rich that pay for humanitarian institutions. Doubtless it is part of the price we pay for our rights as members of society that we shall assist the unfortunate — but the contention is that charity is counter-selective if it is not rationally and scientifically ordered.

Certain aspects of these contentions are too true to be waved aside by pious reference to the brotherhood of man, to the sin of invading the personality of others, or to a variety of tenuous ethical considera-

tions. If not now, when the world is only partially peopled, sometime at least, when the ratio of men to land has undergone great alteration, these contentions will have to be faced.

Sometime, also, we shall be obliged to apply our reasoning powers to a test of the proposition that a large national birth-rate means national prosperity and a smaller one adversity. Our ears have been dinned with denunciations of Malthusianism and with woeful complaints and slashing diatribes about race-suicide. And yet it can not be denied that it would have been better for us all, and for themselves, if thousands of our incapable and suffering fellow-beings had never been born. "It is not the *maximum* number (says Bateson) but the *optimum* number . . . that it should be the endeavour of social organisation to secure. To spread a layer of human protoplasm of the greatest possible thickness over the earth — the implied ambition of many publicists — in the light of natural knowledge is seen to be reckless folly. We need not more of the fit," Bateson goes on, "but fewer of the unfit. A high death rate is often associated with a high birth rate, but happily a low birth rate and a low death rate are quite compatible with each other."

But now, while I have been talking about the fit and the unfit, some of you have doubtless been thinking that physical and mental fitness or unfitness have gotten somewhat confused, where they ought to be kept distinguished from one another. But that can not be done. Even in the animal world mental quickness is a prime criterion of selection; and how much more so must it be in human life! A statuesque and brawny

idiot can not be classed as fit. In spite of this, however, fitness must be founded upon a certain measure of physical superiority; the anæmic and rickety bard is scarcely more desirable for the race than the aforementioned imbecile. Generally the combination of *mens sana in corpore sano* is summed up in the phrase "biological fitness"; and these counter-selective factors are thought to militate against the biologically fit.

Strictly speaking, it is very difficult to define the fit, and easier to identify the unfit. The case is more approachable, that is, in its negative than in its positive aspect. One writer spurns the idea of social position being an indication of fitness, and sees the future of the race in what he calls the "swarming, spawning multitude"; another thinks that the attainment or the maintaining of social position is proof positive of superiorities, at least in the family—though they may be impossible to detect in the individual. If a scion of a family, whose members in former generations have lifted it into a high social position, looks and acts like a degenerate, he perhaps has latent in him the heritage of force and ability of his antecedents. This is a pretty thin strand of reasoning to risk much weight of argument upon; it is almost safer to go in with the advocate of the swarm and spawn. But I repeat that it is relatively easier to fix upon the unfit than to identify the fit. Two men might disagree as to the relative fitness of a sturdy, but ignorant immigrant and a delicate, but cultured gentleman, to hand on their qualities to succeeding generations; but both would unite in excluding from procreation a hopelessly deranged or degenerate person.

To this negative aspect of the matter we shall later return. It is time now that I mention eugenics, or it may seem that, instead of approaching it indirectly, as I said I should, I have been wandering about and not approaching it at all. Eugenics is a science and an art of breeding human thoroughbreds; such thoroughbreds as are not being raised, if a tithe of what has been said about human marriage and about counter-selection is true. Eugenists want to put some such study and scientific method into human breeding as are expended in plant and animal breeding. It would therefore do away so far as possible with the handicapping of the fit in the matter of producing the next generation, and those to follow, throughout an indefinite, limitless future. It aims, in brief, at an improvement of the human breed, through the control of human mating. It is, therefore, an ambitious project and also a truly high-minded and lofty one.

There are many human ills that are congenital — born with us — ills that flesh is “ heir ” to, in the strict sense of that word. Suppose that that *heritage* of ill could be eliminated. There would still be plenty of evil that we could bring on ourselves, to be sure; but the burden of the race would be immensely lightened if we could get rid of all the congenital defects and weaknesses, which handicap human beings before the race is even started. It would be a boon to humanity if it could be relieved of no more than the *worst forms* of these inherited ills — for instance, hereditary feeble-mindedness — and if eugenics aimed no higher than to secure such relief, it would be a noble ideal. Suppose all children to be thoroughly normal and healthy at

birth, of good blood and free from hereditary taint,— the offspring of the union of sound and healthy parents,— what a different place this world would be to live in! What a weight of pain and sadness would have been removed from men! Eugenics plans, through careful breeding, to eliminate such congenital ills.

Part of the imposing sweep of the eugenics programme lies also in the fact that it takes in a more than local perspective — in fact, it aims at the improvement, not of a section of humanity, but of the *race* of men; and the realisation of its object is sought, not now, nor yet in the course of many generations to come, but in the far distant future; — at a time when we are all dust and forgotten, it is hoped that our thought and work will inure to the benefit of those who can never hold more than a sort of abstract and impersonal relation to us. The eugenics enterprise is not one aimed at quick results and immediate profits; it is all sacrifice and labour now that the race may sometime be happier. You will see that such an ideal is calculated to demand high qualities of mind and soul, including a certain broad unselfishness. It is a wholesome sort of ideal to hold, if enthusiasm for it can help one to be patient with the day of small things; or even to be courageous before the conviction that the conditions of human life forbid the hope of more than partial realisation. In short, it is a good ideal to have if one, while he cherishes it, can keep his feet on the ground of actuality. The question at issue is: what can and can not be done, here and now, toward race-betterment?

One of the strongest guarantees of the practical value

of the programme of eugenics lies in the character of its author. The man who set it before the world was Francis Galton, a cousin of Darwin's, and one of the noteworthy scientific figures of the nineteenth century. When Darwin came out with the *Origin of Species*, there was no candid critic who could accuse him of superficiality as a scientist, for a great deal of solid and accepted work lay already to his credit. He was not one of the "bright idea" scientists; in fact, he had been working on the topic of species for considerably over two decades before the *Origin of Species* was published. Similarly with Galton. He had the idea of eugenics long before he first coined and used the term, in 1883; but it was not until the early years of the present century that the matter caught the attention of the civilised world. Galton was then one of the seasoned Nestors of science and had reached an age (he was born in 1822) not often characterised by unreflecting enthusiasm. Consequently his programme was a modest and reasoned affair, at least for the most part, and was in no sense the utterance of a fanatic, heated to the point of vapourisation by the combustion of flimsy mental materials kindled by one lurid idea. A cautious scientist learns after a while to know whom he can trust; and Galton, however much we may disagree with him, is one of the trustworthy. This impression is gotten very clearly from the little collection of "Essays in Eugenics" published just before his recent death.

In this collection will be found Galton's programme of eugenics. He defines it as "the science which deals with all influences that improve the inborn qualities of

a race; also with those that develop them to the utmost advantage." I want to direct your attention to one phrase in this definition before we go farther — that is, the phrase "inborn qualities." What are the "inborn qualities"? Here we face a difficult question indeed — one around which sharp scientific battles have been fought. Galton was not in complete agreement with his more famous cousin in this one important theoretical issue. The disputed point was as to whether characteristics acquired by the individual during his lifetime could or could not be transmitted to offspring, and become "inborn" in them. Darwin believed to a considerable extent in the inheritability of such "acquired characters"; Galton swung the other way; and because his position in this matter was determinative of his programme of race-betterment, we must try to set the issue before us at this point.

Perhaps the best example of an acquired character would be a scar or mutilation. Again, a disease, a mental habitude, a moral stamp may be acquired, where they could not have been inborn. The question is as to whether such acquired characters, or any others, may at length come to be transmitted to offspring, and so become "inborn" or congenital in them. It is almost necessary for any one who considers social theory or sets out to do social service, to come to some conclusion upon this matter — at least provisionally. For it will largely determine how he is to go to work. Let us suppose that a man believes that the life experience and resulting acquired characters of parents are registered in their offspring as inborn characters — as a part of their natural inheritance. Then race-improve-

ment becomes relatively easy. To secure desirable qualities in offspring it is only necessary to evoke desirable qualities in the preceding generations. You do this by providing the proper environment: good food, absence of germs of disease, mental training, moral discipline. Out of this desirable environment of the parents will come desirable qualities in the offspring. If this is true, then, in the uplifting of the race, the proper environment, or life-conditions,—or to use Galton's term, "nurture," is determinative. The acquired characters being good, the transmitted ones must be, and presently we are several parasangs on toward the super-man. This is a theory almost peculiar to social visionaries; it flourishes in a soil that is rather thin, and when the heat of the day comes on, it wilts. This is called the "nurture-theory."

The opponents of the "nurture-theory" believe that each person is a combination of the "natures" of his parents, the "nature" of these latter being combinations of the congenital elements in their ancestors, nearer and remoter. They believe, of course, that the individual may acquire personal characteristics and traits during his lifetime, but they deny that these can so enter or transform the ovum and spermatozoön as to come to constitute a congenital part of the embryo or of the growing and finally adult individual. Your scars can not be inherited; nor your diseases, though your children may inherit a feeble physique predisposing them to take them. Your mind is not going to be strong and keen by reason of the mental discipline undergone by your parents, though if they inherited a good brain you are likely to inherit it from them. The

fact that parents are of lofty or of doubtful morality is not going to affect their offspring through heredity (whatever it may do as the result of contact) unless the immorality, sex-perversion for example, is a result of a congenital defect. Hence the opponents of the "nurture-theory," viewing the matter of improvement from the standpoint of the whole race of men, and over generations, think it can be accomplished only by determining who shall live in the future. But that means: who shall mate in the present. They have no objection, it is understood, to the effort to uplift the present generation and cause it to acquire, for its lifetime, desirable personal characters of all kinds; but they hold that, so far as the progress of the whole race of men is concerned, it is, in the case of the present generation, already too late to do much of anything. It is to them a question of who shall be born; as to what shall be the "nature" of the two streams of heredity which join. This throws "nature" into contrast with "nurture"; and we have here a "nature-theory" over against the "nurture-theory." In the one case you plan to operate on environment — the betterment of conditions; in the other you operate on heredity — the betterment of human mating. The former is obvious and relatively easy, and so it is popular. The latter is beset with the most formidable difficulties.

Thus a belief in the non-inheritability of acquired characters leads one to accept the nature-theory; to emphasise heredity rather than environment. Galton's early studies on genius (embodied in his noted book: "Hereditary Genius") convinced him that genius

either is or is not in a person according as it is or is not already in the streams of heredity of whose union his being is the result. There has been waged a strenuous warfare over this whole matter of the inheritance of acquired characters, with, as it seems to me, decided gains by the party denying such inheritance. The supreme champion of this party has been the German biologist Weismann.

As I have stated the opposing positions of the "nature" and "nurture" theories rather in the extreme, for the sake of contrasting them, perhaps I had better pause a moment to qualify. I can do this best by giving a few words to Weismann's theory. Weismann looks on the body as a vehicle for the preservation and transmission of the germ-plasm, or the heredity-elements. While the germ-plasm lodges in the body it can be influenced in no way by what happens to the body, for instance, the loss of a limb. But the germ-plasm itself may be affected, for instance by the general alcoholic poisoning of the whole body; for in such a case the germ-cells are likewise poisoned and degraded. If the whole physique is strong and healthy, the germ-cells will share in this wholesome condition; and of course the offspring will profit thereby. But all this does not change to any extent the real character of the germ-cells — only their health — and they continue to carry forward the qualities lodged in them, largely irrespective of what happens to the body-vehicle which carries them. They do not seize upon and carry forward qualities developed by their receptacles during life.

The assumption which we must go on, in examining

Galton's programme of Eugenics, is that acquired characters are not inherited — that it is "nature" rather than "nurture" that is determinative in the racial life. Galton proposes that the stream of heredity shall be cleared, not by improving the lower stretches of the stream, but by the cutting off of turbulent confluents so that they shall not contribute to a future race. He believes in operating upon the "nature" of coming generations rather than upon the "nurture" of the present one. To him the great question is: What shall succeeding generations be? That is, put more definitely: Who shall or shall not marry whom? Hence the plan of eugenics is to control human mating, in order to produce a better race, much as animal mating has always been controlled, if improvement in the breed was to result.

Some one will say at once: But all human mating does not take place within the marriage institution. That is true, of course; but it is also fortunately true that a large proportion of the extra-marital relations are unfruitful. In any case, the State, to say nothing of the church, has long wrestled with this matter. Something has been and is being done, while there has been little, if any, thought of race-improvement by changes within the recognised institution. It is to this latter aspect of the matter that eugenics gives its chief attention.

One does not look for inconsiderate enthusiasm in an octogenarian, and Galton does not show it. Anything which he proposes deserves the most serious attention. However, the attitude taken by a reflecting man toward any programme involving radical alteration

of long-standing social procedure should justly be a critical one. One of the distinguishing marks of the educated man should be that he does not believe a thing to be so, simply because he wants it so. Scientific scepticism is what the advocate of any revolutionary social programme should accept and, indeed, invite; your persuaded sceptic is your greatest and most comforting asset. In any case, in considering Galton's programme, I wish to emphasise the *limits* of eugenics as a practical project rather than to discant upon it as a lofty ideal — any one can see that it is the latter. It is becoming popular and is firing considerable unintelligent enthusiasm, as I intimated at the beginning of what I have had to say to you; it should, therefore, in its own interest, be tested and criticised in the light of that sublimated common-sense, which — we have Huxley's word for it — is the same as science.

Eugenics, says Galton, is "the science which deals with those social agencies that influence mentally or physically the racial qualities of future generations." And the programme of eugenics, as proposed by Galton, is: (1) a historical inquiry into the rates of contribution to population of the several classes of society; (2) a systematic collection of facts showing the circumstances under which large and thriving families have most frequently originated; and (3) a study of the influences affecting marriage, that is, of social and other factors that tend to control the strength of passion. Here is some work laid out for the social scientists, comprising economists, anthropologists, and sociologists; but beneath and fundamental to social investigations of whatever sort there must, in this field, lie con-

siderations to be emphasised and clarified, if at all, out of the experience and reflections of medical men.

There is nothing in this investigation-programme that can not be attempted with hope of result. The limits of eugenics do not inhere in the study of eugenics, but in its applications. Let us follow Galton yet a little into his programme for the popularisation of eugenics as a national policy; it must, he says, be made familiar as an academic question until its exact importance is understood and accepted as a fact; it must be recognised as a subject whose practical development deserves serious consideration; and "it must be introduced into the national conscience like a new religion."

This programme does not strike one as quixotic, except for the last point. Galton realises that he is at the beginning, and that the campaign must be laid out over long decades and with reserve. He evidently holds the view that most grand enterprises begin by being academic questions, and there is a good deal of evidence to support him; it is generally conceded that it is worth while to know something, and, if so, the academic reasoner has his function in life. As for the second point, it seems likely that it can be proved, and that readily, to most thinking men, that the "practical development" of the question "deserves serious consideration." But the making of eugenics into a religion is a different matter. What Galton means by this expression is, in reality, that feeling — sentiment — apart from intellect shall be enlisted in the establishment of eugenics; that some sort of motive beyond and above reason, be it fear or what not, must sanction what has been reasoned out in the threshing-over

of the new idea, before the latter can become a reality.

In this latter proposition is the heart of the whole matter of popularisation, for we might well say that if eugenics can be lent the sanction of religion, or a sanction comparable in weight to that of religion, it is sure to prevail; but that if, on the other hand, it must take recourse to rational sanction alone, it is sure not to prevail, at least for long ages, except among very limited groups and classes. Here is a question whose clarification plainly falls to the student of human societies and of their evolution; and since this is the vital issue, within it must lie all the serious "limits of eugenics"—which is now the specific subject before us.

It is easy enough to talk about eugenics getting "into the national conscience like a new religion," and many an ardent soul may be fired by the idea. But in reality the correct and definite conception of what is involved in that attractive phrase carries us back at once into general principles of social evolution and of the science of society. Galton knows this and takes recourse at once to anthropological instances to show that there has been exerted, in the past of the race, a control over sex-passion — and that that control lay, in good part, in religion. Early religion exercised its disciplinary power chiefly through prohibitions, or, to use the anthropological term, now becoming generally current, through taboos. These taboos, as Galton correctly states, prevented the mating of certain men with certain women. For instance, unions between near kin were effectively tabooed. Further it was prescribed that a man must not marry within, or without,

certain definite groups. Later the freedom of union was restricted, at least in the case of woman, to that with *one* man. In some cases, indeed, sex-association was prohibited altogether, and strict celibacy was enjoined, as, for instance, upon priests. All sorts of taboos lay upon the sex-relation; there were no laws about this, but obedience to the dictates of custom, sanctioned in most cases by religion, was enforced by the imposition of the uttermost penalties upon disobedience. Nobody thought of rebelling against these taboos; as Galton says, people grew up under them and knew them as part of life, as one knows gravitation.

He is entirely correct in stating that these are cases of almost absolute control of one of the strongest, and on many occasions, by far the most powerful of human passions; and what is more to his point, here are cases of control of the very passion which the eugenists are most bent upon controlling. Incestuous union, for example, is regarded by many peoples with a horror that precludes the thought even of sex-attraction as between those close of kin. And Galton need not stop with primitive peoples, nor with the restraint of one passion alone. Consider the case of the Hebrews in respect to the food-taboo and the taboo upon unions within certain degrees of blood-kinship. Consider the strength of the taboos lurking in present-day conventions respecting, say, the eating of human flesh or the marriage of the closest kin. If the same distaste were present to forbid non-eugenic unions which exists to prevent the eating of the flesh of cats, the aim of the eugenists would be in large part attained. All these

taboos, primitive and modern, are evidently of the same sort; they are not based upon reason, nor are they capable of being changed by reason, but they rest upon something far more primitive and compelling than reason — upon sentiment and emotion, custom and habitude. This point cannot be over-emphasised. Let us take a more frivolous case of the same thing out of our own life. Some years ago it became fashionable for men to wear short trousers — golf trousers — a great deal. College grounds were covered with young fellows in that costume. Now nobody wears them; you cannot buy them at the clothing stores — which sold out their last stock several years ago, at a few cents per pair, to be made into golf caps. There is now a taboo — perfectly irrational in almost every aspect — upon this style of clothing. If non-eugenic unions should become as infrequent for a dozen years as golf trousers have been for that time, the eugenists could point to a golden era.

But, returning now to the more serious, lasting and elemental taboos, let us see what Galton was driving at when he spoke of “conscience” and “religion” in this connection. It is plain enough from the foregoing that these taboos lay in custom, but it is perhaps not so clear, except in the case of the Hebrews above cited, that conscience or religion had anything to do with them. But they did. When an Australian boy by some error ate the flesh of the emu, which was tabooed to all save the old, he is reported to have died of fright. This is not far from saying that he died from the pricks of conscience, rendered mortal by fear of the ghosts and spirits who sanctioned the broken taboo.

The case of Oedipus is a parallel one on a higher stage. Despair in both cases was the result of fear — the conscience of the race was never, historically, awakened by any other sentiment than fear. Furthermore, this fear was the intangible and helpless fear of the supernatural. It is plain that the taboos of primitive people, as recounted by Galton, satisfy him as to their connection with the group-conscience and with religion. If now, we wish to place eugenics under such sanction, we must try to find out how the effective taboos gained their power, for in all probability eugenics must go the same way to attain a like control.

Parenthetically, it may be remarked that Galton seems to mean by a "new religion" a sort of religion of rationality, a sublimated intellectual faith. But this is not the style of religion that ever lent any sanction to any taboo worth mentioning; and it is far from being the kind of religion invoked in the cases derived from primitive life. Such a "religion" lacks real and elemental strength, being bereft of that control over action which feeling wields practically alone. Of this more presently — here and now it is understood that we are dealing with religion as it has been known by and has controlled man throughout the ages.

So far as we are able to reconstruct the remote past — for all the strongest social taboos were in operation before history began — the line of development was, briefly, as follows: Men acted first and thought afterward — long afterward. In the effort to live men reacted upon their environments in various ways, some advantageous and some disadvantageous. By the activity of unconscious selection, operating upon

human groups through the annihilation or subjugation of those possessing less fit ways, certain social habitudes became prevalent, persisting with the persistence of those practising them. For instance, a tribe will not eat fish, for superstitious reasons. Other neighbouring tribes will. The latter, especially in time of drought, become stronger and more numerous, than the first tribe. Conflict ensues and the first tribe is annihilated or subjugated. The fish superstition vanishes; it is thus selected away unconsciously. Nobody set out to destroy it. This is along the familiar Darwinian lines. Then, certain ways having succeeded for a group, they were gradually enforced upon it by the living authorities, and at length by the authority of the dead, which, by reason of the stock primitive beliefs, was infinitely more powerful than that of the living. What the patriarch when alive had enforced by temporal means, he did not cease, when he had become a spirit, to enforce by his now supernatural and irresistible power. These ways then came to include a judgment that they were good for the society in question, and became fixed and inalterable. Men were as unconscious of their restrictions as we are unaware of the tension of the atmosphere. When habitudes have arrived at this stage, they become the *folkways* or *mores*, as Professor Sumner called them, and as such formed the basis and germ of all our later developed social institutions.

It is particularly to be noted, however, that they had become custom before ever they joined relation with religion or law. Religion and law sanction the folkways; they do not make them, and neither religion

nor law can long exist in contravention of them. To get eugenics from religion into custom, as Galton at times seems to wish, would save much time but would reverse the order of evolution. Religion, as a student of its origins and history will readily admit, and as a dispassionate observer of contemporary life will have noticed, but rarely lends effective and enduring sanction to anything that has not time out of mind existed in custom; even written law may long precede religious sanction. The Middle Ages demonstrate the attempt to proceed from dogma to the regulation of practical life and its customs and ways. In general, religion can lend effective sanction to custom only. But a thing that becomes a custom — a folkway — must have been, in origin, a tried and proved expedient in living. If this is the only kind of thing to which religion can lend effective sanction, then eugenics if it is to be “introduced into the national conscience like a new religion,” must first pass into the body of habitudes and traditions.

How can this be done? Or, to put it more concretely, how can unfortunate unions be effectively tabooed, as incest is tabooed? Applying the principles we have developed, and their implication, it might be answered: Not by rational prescription, but by sad experience; not by persuasion, but by pain. The conviction that such and such unions are evil must be brought home to the masses, if at all, not by the microscope or the statistical table, but by actual, tangible misfortune, and on the large scale. This alone will cause them to distrust their accepted “ways,” and to tolerate the thought of other ways. There must at

least be personal suffering to be compared with the weal of others; or, since this is a social matter, there must at least be a comparison of the destinies of societies practising, respectively, good and bad systems of man-breeding. "At least," I say, for such an outcome, though it looks slow and hard, would be far too easy a way. It is doubtful, contemplating in the light of the past, if a process even thus tardy would be practicable; reform in such manner suggested and rationally adopted would appear too cheaply bought to be a human purchase. To judge by the past, individuals and societies are not introspective or rational enough to perform such a feat of pain-economy as this; anticipatory convictions arrived at by the comparative method have played little part in the moulding of the race. For a people to become rationally eugenic, would be a performance certainly far eclipsing in grandeur the changing of folkways presented in the recent history of Japan; and yet assuming that the latter development was purely rational in its origin and prosecution, it stands to all as a sort of latter-day wonder of the world. It could not have been accomplished in the absence of a discipline to which Europe and America are strangers. It does not seem possible that eugenics could thus be realised; a convention or habitude such as eugenics would demand for its general and unquestioned acceptance would probably have to go back for its origin to the destructive efficacy of group-conflict, to annihilation or subjugation of those practising non-eugenic mating. It is thus only that the expediency of the folkways has been proved — without reasoning, but beyond peradventure.

A baneful custom — close and continued inbreeding, for example, is driven from the world, persisting only in out-of-the-way stations. How? Because inbreeding groups have succumbed in the conflict with those whose blood and ideas are freshened by mixture, or they have persisted solely in isolation from such competition, in the corners of the earth. In competition they have lost their lives, or their group-identity. In general, societies prosper as they give up close inbreeding; a tendency towards exogamy or outbreeding has been an advantage in the conflict of races. For this reason it has passed naturally into the folkways.

How might eugenics take a similar course? Suppose that the races of the present day differ in their observance of eugenic principles, in their toleration of counterselective agencies, and the like. If then, ill-breeding and counterselection are great handicaps, the races that depart from them already possess a substantial advantage, which must some day tell. If it does, then eugenics is sure to crystallise into a policy of successful living, that is, to get into the customs and habitudes of controlling groups. Having become by demonstration a heritage of unquestioned value, it is then a candidate for religious sanction. It is hard to see how eugenics can receive wide-spread acceptance without some such conflict and survival. Perhaps in these later ages, it will not be necessary to go through all the crudity and cruelty of the race-struggle; perhaps such selection can be avoided or anticipated by the taking of thought. But if eugenics can, even within centuries, as a result of rational analysis and demonstration, and of propaganda based thereon, come to

stand for a "national religion," then it must be admitted that there has come about a qualitative change in the ways of men — the folkways. For it is into the body of these that eugenics must penetrate, if it is to become such a force as its founder hopes.

This is the great and vital limit of eugenics as a grand human policy. It would seem, in thinking of certain of the folkways — for example fashion — that their alteration might be possible without invoking such an elemental process as the one described; and this is true. But the folkways are alterable in proportion as they are new and superficial and are the more persistent as they are the more inveterate, deep-seated, and elemental. But eugenics deals ultimately with one of the most elemental of things — with the union of the sexes; with the establishment of new ways in that which has to do with the great elemental passion that ensures society's self-perpetuation. Here we should expect folkways to be inveterate, deep-seated, and elemental. Hence it seems reasonable to draw the case at its hardest; and I believe experience would here support theory.

It is not meant to say, however, that nothing can be done. Some advocate a let-alone policy, but that is not man's way; he seems to be under the sway of a nature-force which impels him into rational efforts to control nature-forces of many kinds. All civilisation is really a collection of maxims and methods for mitigating or evading the action of nature-forces, so that man will try to do something, however forlorn the hope — and not every forlorn hope has come to a melancholy end. If we cannot get at the matter on the large scale and

positively, we can do something by assailing the extreme cases of bad mating. Non-eugenic practises can be crippled, if they are not eradicated, and may be held within bounds, narrower or wider. In any society the wiser and more powerful are constantly handing down the ways of their group to the more ignorant and less powerful, and by virtue of their superior intelligence they are able, through the control of the societal organisation, to set up regulations which, if they do not have the force of prohibition sanctioned by religious fear, have at least the power of the State behind them. Such regulations, as everybody knows, are effective in proportion as they are negative and concrete in form, like the primitive taboo; contrast the laconic, "Thou shalt not kill" with the diffuse, "Thou shalt practise eugenics (if by some chance thou canst gain any adequate conception of the same)." This latter sort will not do — societal control must be more rude and peremptory, and more definite. It must make utterance more as follows: "Thou shalt not, being an idiot, marry and beget thine own kind; nor yet, being relatively sane, marry an idiot." Eugenic legislation must turn resolutely to the heavy-handed prohibition of the grosser, more obvious and undeniable cases of counter-selection. Very likely an almost general consent could be gained to the prohibition of the union of imbeciles; in fact laws now exist forbidding it, and they are not so foreign to the feelings and prejudices of the masses as to be dead letter.

I say that we can assail the worst cases of non-eugenic union — that we can practise "negative eugenics," as it has been called. But when we try to do

much more than this, we encounter, again, the limits set by the folkways, for the latter have a certain consistency among themselves, and an attempted alteration of certain conventions may wreck on the opposition of certain others, which are apparently, at times, only rather distantly correlated with the ones assailed. The recent law of Connecticut providing for the sterilization of certain sorts of dangerous persons horrifies many sensible people; and to justify such a horror there is always a reservoir of argumentation, illustration, and interpretation, to be drawn upon. As the gross and obvious is left behind and an attempt is made, for example, to insist upon a physical examination of those who propose to contract matrimony, the ranks of the objectors (and so, of course, of the evaders) fill up. Such objection may be most natural — based, for example, upon the sentiment of modesty. Here are, again, the limits of eugenics as set down in conventions or folkways. These limits are, after all, very narrow; and it is not needful to remind the present audience that they are not overcome when once the law is inscribed on the statute book.

To sum up: The inevitable limits of eugenics lie in these mysterious conventions, habitudes, and prejudices which seem to rise and to change with something of the elemental deliberation of the seasons — unhurried by man, invulnerable to his argumentation. They are not rational in nature and as a consequence do not admit of rational discussion or alteration. The folkways are a matter of "second-nature" — of feelings — and those folkways which are connected with so elemental a function as the procreative, are very deep-seated.

All fruitful agitation for change must confine its aspirations within discreet limits. It must enlist sentiment if it can, rather than reason; and the great compelling sentiment is fear. Fearlessness is not seldom the result of pure ignorance, and the discreetly fearful man is generally the wise one. By combating the ignorance of the more highly endowed — those of greater opportunity who may become the leaders — a beginning can be made. This is one of the reasons for this lecture. Further, fear must be brought home. Some men are able to fear and worry for the far generations of mankind, but not many of us can get up much excitement over the fate of even our great grandchildren. Fear must be brought *home*, I say; and to the individual. Here is where the layman falls short, and where the doctor should come in; if, for example, any young man of reasonable sense knew what the doctor does about the manifold ills of an unchaste life, fear would deter him from incurring many and serious dangers both for himself and for his descendants to come. One of the not unimpregnable limits of eugenics is the ignorance that nobody but the doctor can enlighten. Doctors need not name names, nor break professional reticence, but they should speak out. If certain of the counterselective factors are really injuring the race, their noxious action should be insisted upon and reiterated; if there is an error in these matters — if, for example, we are mistaken in listing certain items as counterselective — then they should be dropped off our list.

The medical men must have their duty and opportunity to promote societal betterment ever before them.

Medical schools should educate their students to a realising sense of their social responsibilities, and fit them to see, beyond the patient in the chair, into the perspective of the millions of human beings struggling to live, and of the other millions yet unborn. Eugenics is a grand idea. The barriers that rise before its even partial realisation are certainly high, and perhaps insuperable. But there is one human instrument available for the assault upon any human difficulty, and recourse to its use is never fruitless — for even though the particular object fails, it will be of use somewhere else — and that is *education*. The eugenics programme at the very least opens up a series of questions on which light is needed; and this light can be given only by the enlightened, laborious, and fearless. People need to be made afraid of what is unwholesome and disastrous in society. The preacher used to inculcate this fear by various means, such as the threat of eternal fire, now no longer available; his only effective successor in this societal function is the doctor. Let the doctor speak out what he knows! Then let us take what he says and pass it on, in the measure in which it can be received, to the rising generation. It is not right for the young to grow up in Egyptian darkness as respects the life of sex. It is the duty of their natural protectors to inform them, shifting this obligation neither to the unqualified school-teacher nor yet to the knowing comrade. Our folkways prescribe a senseless squeamishness in regard to one of the two great functions of any individual or society. We inculcate all we can concerning self-maintenance — making a living; but we are unduly reticent about self-perpetuation — the

procreation of the next generation. And yet we know that there is scarcely another topic upon which the curiosity of youth, be it natural or morbid, focuses so sharply. Nature herself has provided that this shall be so. If coming generations shall have been educated up to the keen issues of the future, they may not, it is true, succeed in securing general felicity — in breeding a race of super-men — but they should be able to mitigate some of the extremer forms of manifest evils under which society groans and labours in the present.

It is not my object to detail to you the scattering and sometimes whimsical efforts at reform which appear in the newspapers under the name "eugenics." I hope I have discouraged nobody from doing, now and in the future, everything and all that he can, in reason, toward the realisation of Galton's magnanimous idea. I repeat that I do not advocate a let-alone policy, but a policy of activity within the limits of a reasonable hope of success. Above all I urge an intelligent study of these matters, in all their aspects. They are vital things indeed. And we know so little yet about them. What we need is to get into our heads the conception of the *race's* interests — the broad view of humanity through the ages, labouring and struggling on, under heavy burdens — an infinitely pathetic spectacle. If a man can see that long procession, in his mind's eye, he will feel that it is a crime for him to add, even a little, to its melancholy. Chastity of life will seem to him, when he views the smirch of unchastity carried over and visited upon the innocent for generations, to the weakening of body and mind — chastity will seem to him less a thing to be proud of than a thing whose

absence is unpardonable. He will feel that sin is not an individual matter, but concerns and wrongs those of time to come. In short, he will get outside his petty self and see that he is swimming in the world-currents and is part of them in their cosmic course. He will feel that he has no right to withhold what he can do in renunciation or in a positive way to improve the hereditary outfit of future generations. As Faust says:

Es kann die Spur von meinen Erdetagen
Nicht in Aeonen untergehn.
(The imprint of my earthly day
Cannot in ages pass away).

This is no sermon. I do not wish to seem hortatory. I esteem at the highest the attitude taken by Galton and the scientific eugenists. I would have it as it is — austere and cool rather than sentimental and heated. Therefore I have confined myself to an exposition of that *attitude* and have warmly advocated *it*, rather than any specific measures. If one sees the point of that sort of eugenics, he will proceed at once to inform himself, and with knowledge will come the proper interest in specific projects, and also the capacity to judge of them. With it will also come, I trust, the nerve to insist upon what common sense demands, despite the discordant cries of the multitude, or the protests of a sickly sentimentality.

Eugenics is a story that cannot be told in an hour. Here you have what I think to be its essence; and with this I must close.

X

SELECTIONS FROM AN ADDRESS ON EUGENICS ¹

W. H. CARRUTH

LONG before the alarmed cry of Theodore Roosevelt against "race suicide" called public attention in America to this subject, thoughtful students had begun to point out appalling tendencies toward degeneracy in the breeding of civilised nations. In so far as the warning against "race suicide" was merely an indiscriminate appeal for more children, a revival of the Biblical admonition to "be fruitful and multiply" without forethought and safeguards, it was only a blind summons to more "race suicide." What the world needs is not indiscriminately more children, but more children from the best stock and fewer from the worst stock.

What Francis Galton and his friends pointed out in this connection was, that the world is increasing from its worst elements more rapidly than from its best elements: The first and simplest observation in this field is that one-fourth of the married people in any recent generation are producing one-half of the coming generation. This is, indeed, somewhat more striking than the mere statement that some families have more children than others. Yet it is only the statistical formulation of that commonplace observation.

¹ Given at the University of Kansas, May 8th, 1913. This lecture has been reduced in length by the omission of paragraphs on biology the sense of which had been set forth earlier in the volume.

And it illustrates the importance of statistical study. For after reading that portentous statement: One-fourth of the present generation is producing one-half of the next, the question naturally suggests itself: Which one-fourth is it, that thus dominates the coming generation? If the answer to this question should be: This one-fourth averages for vigour and health and desirable qualities as high as the entire population, we might drop the matter and say: It is then a matter of personal concern only, what families shall bear children and what families shall not. But the facts gathered by the great statistical offices of the world reveal a different state of affairs, and this is sufficiently summarised for our purpose in the statement that the undesirable fraction of the world's population is contributing much more than its share to the future generations; that there is a distinct and direct ratio between civic undesirability and high fertility, not a necessary, but an actual one; which means also, that the desirable fraction of society is contributing less than its share to the coming humanity. It should be said, to guard against suspicion of snobbery or aristocratic squint, that "undesirable" has here no social connotation, but means solely, the parents least likely to produce sound and fit children.

In the face of these simple but deeply significant facts, the question of human breeding, of what classes and what families shall produce more and what classes less children, the question of reversing this destructive tendency in the development of civilised humanity, becomes forthwith a public question of the first magnitude.

The impressiveness of this problem is rendered more so by a consideration of the facts regarding the defective classes. In England and America the number of children per family in these classes is greater than in the average middle-class family, being from 5.7 to 7, while in the families of normal working classes the number is about 5.5, in English intellectual classes 1.5 and among Harvard graduates 2.0. In England it is reported that "the greater the number of professional men or of servants employed in a community, the lower the birth-rate; while the more pawn-brokers, child labourers, pauper lunatics, and tuberculosis the higher the birth-rate." In London sixty years ago, the more professional men and well-to-do families the community contained, the higher the birth-rate; while for ten years past this has been reversed, and the more of these desirable families in the community the lower the birth-rate.

In England the ratio of defectives to normals more than doubled between 1874 and 1896. The ratio of the known insane doubled in the decade preceding 1901. In Great Britain in 1901 there were 65,700 idiots and lunatics legally married and multiplying. In the United States between 1880 and 1903 the ratio of defectives increased one-fourth. In 1910 the number of insane and feeble-minded, blind, deaf and dumb, paupers, criminals and juvenile delinquents in institutions in the United States was 841,244, and the estimated total of such 3,000,000, or one in every thirty of our population. ¹¹

Similar figures could be cited from other countries. French physique has declined since the Napoleonic

wars so that the average height of Frenchmen has fallen two inches, and the physical requirements for the army have been reduced more than once. In "The Human Harvest" David Starr Jordan has pointed out impressively the physical decline of Spain, of certain Swiss cantons, of Italy and Greece, of Ireland and perhaps England, due largely to the elimination of the fittest men by various factors that reverse natural selection — chief among them War.

So long as no connection was recognised between heredity and the existence and increase of the defective classes, we could calmly look upon them as visitations of Providence, and complacently explain their greater prominence in these later days as the evidence of our own growing Christian philanthropy. But with the defective classes increasing more rapidly than the sound and normal, no amount of Christian benevolence will prevent the decline and decay of the nation. Time and a percentage to the bad of 51 will bring about ultimate ruin of any people or institution. Not all the blood of beasts on Jewish altars slain, nor any amount of self-satisfied contemplation of our superior humanness as compared with the pagan past, can stay the decline of a nation which breeds predominantly from its worst fraction. It is time to recognise that the only blood which can effectually save an individual or a race in this world is the blood which flows in the veins of the parents of the coming generation.

Now the air is full of eugenics. What does it mean? Within the past three years a score of books have been published with this or related titles. The magazines devote more or less space to it every month

and the press syndicates find it very filling food. Quite a number of University courses primarily and secondarily dealing with the subject, have been introduced in this country within the past three years. What is it all about?

So far as interpretation of words goes it is an easy matter. Eugenics means the science of being well born. It is the study of the good or right breeding of human beings, or to use the expression of Francis Galton, regarded as the father of the subject, "It is a study of the agencies under social control, that may improve or impair the racial qualities of future generations, either physically or mentally."

How difficult it is to deal with the subject is illustrated by the fact that the phrase "good breeding" was long since pre-empted for another and much more limited sense, to wit: Good rearing and fine manners.

Yet it seems justifiable to insist upon using the good Saxon word in its original sense, the same that it has in speaking of the breeding of animals, that is, the knowledge and practice of the ways and means for producing and rearing the best possible offspring, in a word, *right breeding*. Only in so far is this new science, as it is sometimes called, differentiated from animal breeding that the latter often looks to the improvement of the last set of offspring only, looks narrowly at the market value of the immediate product, while human eugenics aims fundamentally at the improvement of the race and looks into the future "far as human eye can see."

The improvement of the human race by breeding, as well as by education, is certainly no new programme. Wise men and women and national leaders from the

earliest dawn of history have recognised that there was here a problem and have given more or less random suggestions toward its solution.

The breeding of stock and of plants has become a practical art. But the recognition of the need of thorough scientific study of the subject before writing out a plan of operation seems to belong to very modern times. Francis Galton, who died only the past year, a cousin of Charles Darwin, was the voice of one crying in the wilderness to call his countrymen of England and the world to repent the neglect of the great problem: the future of the English and the human race. In "*Hereditary Genius*," 1869, as well as in certain papers in journals going back to 1865, he called attention to the fact that mental as well as physical qualities are inherited and later he shaped the problem more definitely with his "*Inquiries into Human Faculty*," 1889, and again in the famous Huxley lectures of 1901, "*The Possible Improvement of the Human Breed under the Existing Conditions of Law and Sentiment*." Finally in the address before the Sociological society of 1904 and 1905 he promulgated the title for the science, "*Eugenics: Its Definition, Scope and Aim*." Aside from his own publications Galton inspired younger men to take up this study and supported the beginnings of scientific investigation by the formation of the Eugenic Laboratory in the University of London which is presided over by Karl Pearson, Galton's chief disciple, while these investigations are being zealously pushed by Bateson, Lankester in England, Davenport and Castle and McClung and Kellogg, in America, De Vries in Holland, Cuénot, in France, and practically all the

biologists of the world who are working in the field of evolution and heredity and contributing to the development of the science proclaimed and christened by Galton. Several journals devote their entire space to the discussion and publications of the Science, such as the *Archiv. für Rassen-u. Gesellschafts-Biologie* and others. The Eugenic Educational Society in England, the Committee on Eugenics of the American Breeders' Association and the Eugenic Record Office at Cold Spring Harbor in America are among the institutions devoting themselves to the accumulation of truth in this field. The First International Eugenics Congress, devoted to the discussion of this problem, was held in London last summer, one of our own alumni, Prof. V. L. Kellogg, taking a prominent part in the programme, as well as two of our sons-in-law: Prof. W. E. Castle, of Harvard and Prof. C. B. Davenport, of the Carnegie Institution at Cold Spring Harbor.

It is plain, at a glance, that the programme of good breeding may deal with the individual both before birth and after birth. Hitherto the greater part of human effort applied to the betterment of individuals, and indirectly of the race, has been applied to the child after birth, to what is called in homely language, "raising" the child. The new science and art will, perhaps, not ignore this field altogether, but it lays most stress upon the influences which surround the parentage, the conception and the pre-natal life of the child. This purpose is quite clearly based upon the assumption that heredity is a very important factor in determining the character of individuals and races. There are eugenicists, indeed, who seem to ignore the importance of

environment almost wholly, laughing at the old saw, "Just as the twig is bent, the tree's inclined," unless, perhaps, they find the bend before conception.

So far as it presents comparatively new problems, then eugenics, or stirpiculture, as the subject was once more fittingly named, deals with the breeding of human beings, the getting of them better born.

This work, obviously, again involves two fields: The life of the individual *after* conception, and the determination of the conditions of conception itself; or, we might say: pre-natal influences, and mating conditions.

Here again, it is plain that pre-natal influences belong at bottom to the same field as post-natal influences,—that both are elements of education, or of rearing. Thus, if the size of a calf or a child can be influenced by feeding after birth, it can also be influenced by the food of its mother before birth of the young. The temper of a colt or a child can be affected by the way the mother is handled before the young is born. All this has not always been recognised fully and clearly, but I believe it is undisputed to-day.

The startling thing about the new science and art is the proposal to study and modify the conditions of mating for the benefit of the offspring and the race.

In nature, aside from civilised man the progress of species among the vertebrates is determined by comparatively simple factors: Mating, fertile mating, is limited by the species boundaries, and by geographical propinquity, and within the species and neighbourhood it is largely restricted to the strongest or most cunning or most beautiful among the males, the latter factor

coming into play to determine the choice by the female. Survival of the young when brought forth is determined by natural vigour and cunning, succoured by the protective guardianship of the parents during earlier infancy. I call attention here to a great restriction upon the law of the survival of the strongest and cunningest, to which, it seems to me, due attention has not been given in its place: The young survive despite their weakness and lack of cunning; parental sacrifice and guardianship is the first great interference with the law of the survival of the strongest and most cunning. Not the fittest at the time, but the potentially fittest, survive in the case of infant animals as competitors with their parents. When we come to speak of interference with the laws of Nature, this primary interference in species below man is not to be forgotten.

Nevertheless, as said already, the conditions of propagation and survival are comparatively simple among vertebrates below civilised man. But it has been declared that man, civilised man, has violated and reversed the laws of Nature in this field. Certain it is, that he has greatly modified those simpler conditions of survival, although we should hesitate to speak of reversing the laws of Nature. Caution bids us hesitate about speaking of reversing the laws of Nature. It would be better to say that Nature has here other laws.

While among civilised men strength, intelligence and beauty are still leading factors in the selection of mates, a large number of other factors have come into play which sometimes quite outweigh these primitive ones, as: race prejudice, religious, political and social bar-

riers, prudence, ambition, war, the last factor not as a deliberate constraint upon individuals, but as an unnatural elimination of those fittest for mating. It will be noted that these new factors in determining mating are all restrictive in their operation. The only extensive positive impulses to breeding given under civilisation, so far as I can discover, have been the breeding of negroes and hybrids for slaves, the breeding of women for concubines in Oriental countries, and the subsidising of the breeding of men for cannon-food in various great imperial countries.

Again, while with vertebrates below civilised man, mating having been accomplished under guidance of the factors of strength, cunning and beauty, the operation of the law led to the production of the greatest possible number of offspring and the gradual elimination of the weakest during infancy; it will be observed that the operation of these new factors of civilisation in human kind has been: first, to accomplish the mating for many objects not calculated to favour the development of the strong and the beautiful; next to restrict the number of offspring, and last, to check, through Christian compassion, the elimination of the physically unfit, while directly furthering through war, the elimination of the bravest and fittest.

“The aim of eugenics,” wrote Galton, “is the production of a more healthy, and vigorous and more able humanity.” But, for that matter, so is it the aim of education.

“The aim of eugenics is to represent each class by its best specimens; that done, to leave them to work out their common civilisation in their own way; to bring

as many influences to bear as can be reasonably employed to induce them to contribute more than their present proportion to the next generation," and to cause the useless, vicious classes to contribute to the next generation less than their present proportion.

The proposal to modify the conditions of mating for the benefit of the race rests absolutely upon the trite assumption that the offspring "take after" their parents or their forbears; that the better parents produce the better children,— rests in a word upon the belief in what is vaguely called "heredity."

In fact, comparatively little is known about heredity, and especially about the method of heredity. Everybody knows that the nature of the offspring is determined in certain fundamentals by the nature of the parents. Species begets species. But nobody knows, as to a large number of qualities or traits, whether they are inherited, still less how.

Here arise part of the problems of the new art. If the offspring were in all respects copies of one or the other parent, or if they combined in known and definite proportions the traits of the parents, it would be an easy matter to prepare a handbook for the production of a race of a certain character, provided we could find parents anywhere with the traits desired in the new race and persuade them to mate accordingly.

But we are only beginning to learn what traits are transmitted and what not transmitted, and in accordance with what laws. In this portion of the field, the problem, the present problem, of eugenics is purely a

biological problem: the establishment of the detailed laws of heredity.

It becomes obvious that the programme of eugenics covers, first, a comparatively small field in which we may be guided by very definite knowledge and that this field is one largely of negative action, second, a very much broader and perhaps more important field, but one within which we have not yet sufficient knowledge for safe guidance. The first field has to do largely with the prevention of the mating of the absolutely unfit; the second with the possibility of positive breeding for definite good causes. In the first field, the restriction of defective offspring, immediate action may be found wise and steps taken by individuals, societies and governments. In the second, the possibilities of positive breeding, the call at present is for scientific study. Mr. Galton has formulated here the following educational and scientific programme:

Dissemination of knowledge of the law of heredity.

Historical inquiry into the rates with which various classes of society have contributed to the population.

Systematic collection of the facts, showing the conditions under which large and thriving families have originated.

Influences affecting marriage.

Persistence in setting forth the national importance of eugenics.

Men of science, in general, despite their failure to agree on some fundamental elements of the problem, are hopeful of attaining definite and vastly beneficial results in this second line in the future but at present

recommendations for a definite action in this field should be received with caution if not scepticism.

In any case, there is enough of the eugenics programme left for present action to make it of the utmost importance to discuss it in all responsible and intelligent circles, to make it familiar as an academic question and to introduce its ideals into the national conscience as Mr. Galton has said "like a new religion."

"The improvement of the stock is one of the highest objects that we can reasonably attempt."

Assuming the facts of heredity to be established, or building merely on those which are already established, we may say, that the parents transmit at least a portion of their qualities in accordance with definite laws.

Now comes the real problem of eugenics, as the science and art of Race Breeding. It will fall, in its practical applications into the following branches:

1. The prevention of marriage or at least of procreation on the part of the hopelessly unfit, as of the insane and feeble-minded, or those with otherwise hopelessly impaired physiques.

2. The education of the intelligent and self-controlled so as to enable them when mated to either abstain from begetting altogether, or to beget so as to transmit their desirable and suppress their undesirable qualities.

3. The encouragement of mating with the aim in view of begetting the best possible offspring, or at least, of making this a conscious factor in the consideration of marriage.

It is obvious that the first of these proposals is vastly more tangible and feasible than the other two. Public opinion would be practically united on the proposi-

tion that imbeciles and the hopelessly insane should not be permitted to reproduce their kind. Moreover, since the insane are usually in custody they are practically prevented from so doing. But when we recall that insane people are released from custody and pronounced "cured"; that there are milder forms of mental deficiency which do not usually require custody; that there are mental or temperamental conditions which, while indeed they foretell insanity or feeble-mindedness, are not commonly regarded as defects at all, and to all of which the eugenic programme would or should apply, we recognise that there are serious difficulties even in this first field.

Under 1, the remedies to be considered are:

Isolation or Segregation, or placing under state control during the reproduction period.

Sterilization: (Vasectomy or Oöphorotomy) in Indiana, Connecticut, Oregon and nine other States. (Contrast with these devices the old Greek method, the killing off of defective children.)

The remedies proposed under 2, are:

Study of the laws of heredity in great detail.

Teaching of self-control, and, possibly, sterilization. Why may not at least the negative part of the eugenic programme be imposed by growing judgment upon the sentiment of coming generations? Perhaps later the positive part of the problem may also become possible. The positive programme already appears in one form in the protest against the avoidance of parentage by the fit; — and against celibacy.

It is easy to acquire and spread confusion regarding the significance of inheritability. Let us try to state

the practical side of the laws already known, bearing in mind that only a beginning has been made in the field, but that much is to be hoped from long and patient study. The results obtained by statistical methods such as those pursued by Galton serve only to emphasise the fact of inheritability and the enormous importance of this fact for the individual and the race. The practical side of the matter lies in the establishment of the laws regarding the bequeathal of the qualities from a given pair of parents with known or potential characters. In a word: If A has a certain character and mates with B who has, or has not, the same character, what are the laws of certainty or probability regarding the transmission of this quality to immediate or remote descendants?

Here science distinguishes between what is called "unit-characters" and those which are not "unit-characters"; the latter, being complex, cannot, as such, be called inheritable. So far as unit-characters have already been determined, well and good. But what is a unit-character can be determined only by the fact of its being inherited. That is to say, the distinction does not help us to distinguish, but is merely a convenient phraseology when the distinction has been determined.

Species and sex characters are unit characters: the tail of the dog, the beard of the man, the breast of the female, are regularly bequeathed, to some as dominant, to others as recessive. The mother has not the father's black beard dominant, but she inherits it recessive, since she may bequeath it to her son.

Certain other characters, also unit characters, as

eye colour, polydactylism, corpulence, hysteria, deaf mutism, are regularly bequeathed but some may be latent or "recessive" and not come to light in the descendant for one or more generations. When such a recessive character again becomes dominant in a pure, or potent, late descendant the phenomenon is sometimes called atavism, that is, a return to an earlier ancestral character. Thus the strong dominant characters of most domestic animals, which make them desirable and useful, often disappear after a number of generations in a wild state, in favour of the characters of the wild type from which they sprung.

The precise laws of individual inheritance for the good and normal qualities of human kind are but little known. Most of our present knowledge has to do with the inheritance of abnormalities and diseases. This is due to the great difficulty of carrying on experiments with human beings and to the fact that abnormalities are more obvious and more easily studied than the normal phenomena. This means, moreover, that for the present our practical wisdom in human breeding is chiefly along the lines of what to avoid rather than of what positively to cultivate; of who should not marry and mate, rather than of who should and how.

And now it may be said, that the latest investigators are inclined to conclude regarding most inheritable diseases: that not so much the specific disease is inherited, as that a susceptibility to the disease or group of diseases may be bequeathed; or it may be the opposite case: that immunity to a specific disease is bequeathed, just as it can be imparted through serum treatment. The method of this inheritance need not concern us

so much, since it is still a matter of hypothesis. Suffice it to say, that such inheritability is assumed to be 'due, not to the transmission of a specific taint, or germ or poison, or organic defect, but to the absence of certain elements in the germ-plasm, called "determiners," mysterious chemical molecules which transmit normal control and directive powers. When these are absent, the organism with which they are related fails to react soundly to the appeals and assaults of its environment, fails to resist, grows weak, breaks down and destroys the sound balance of the individual.

As a further illustration of how this works out, consider any one of the germ-diseases, as tuberculosis. This disease cannot exist save through the specific action of the tubercular bacillus. And to one who has looked into the microscopic minuteness of germ structure it is easy to accept the assurance of the scientist that this tubercular bacillus cannot itself be transmitted by way of a germ-cell. It must be lodged in the organism from without. And this particular bacillus is omnipresent. No one of us is free from its assaults. But it succeeds in its destructive work only where it finds favourable ground, low vitality, weak tissues. Now weak tissues, in this case, let us say, of the mucous membranes, are inheritable, and thus a susceptibility to consumption may be bequeathed. Add to this, that the tubercular parent furnishes to the child's atmosphere much more than the normal number of bacilli and very often, too, the most favourable outward conditions for their development, and we have practically, if not quite literally, the inheritability of consumption.

As has been said, when both parents are afflicted

with an inheritable weakness we are fairly sure that their children will manifest the same weakness, or a related one. When the germ plasms of both parents are free from a given inheritable weakness we may be equally certain that their children will be free from it.

Such is the general practical teaching regarding inheritable diseases. It is a serious mistake to assume that either Nature or Nurture wholly determines the fate of our children. Nature, indeed, furnishes the essential elements. Nurture cannot expect to develop fundamental and genuine capacities for what Nature has furnished no substratum for. But, on the other hand, Nurture, or the lack of Nurture, can thwart Nature, can suppress, blunt, stunt, distort, mislead, the gifts of Nature that were intended as blessings for the individual and the race. Or on the positive side, Nurture, recognising the potentialities furnished by Nature, can prepare to furnish the most favourable conditions for their growth. The best soil in the world and the best tillage cannot produce a heavy corn-crop from poor seed, though they will get better results than will come from a combination of poor seed and neglect. Neither will the best seed in the market produce great crops on poor soil and under poor tillage. Great results are to be obtained by carefully selecting the best seed and then giving it the best possible care on the best possible soil. So it is with men. Yet how strange that we have given to the man-crop, of such infinitely greater importance to the future world, so much less attention, so much less study, so much less expenditure of funds, than to the corn-crop or the potato-crop or the hog-crop, or any other!

Probably the first thought of most people on the subject of deliberate mating for improvement of the human breed is that it is impossible if not undesirable, or even abhorrent to refined civilised instincts. But second thought shows that what is called "natural selection" among lower animals is modified by a great number of factors among human beings, which may conveniently be spoken of as constituting "artificial selection."

Aside from the very natural restriction of geographical confines, which limit mating in all animals, man included, the subjective restraints of religion, clan, tribe, race, social and financial caste, economic prudence, and many others, draw more or less solid and permanent barriers between men and women who might otherwise mate. Tradition has made most of these restrictions automatic and made the subjects unconscious of their operation. But they are restrictions imposed upon natural instinct by the more or less wise opinion of mankind. Monogamy is not a law of nature, but of certain human societies. The forbidden degrees of consanguinity are only half effectual when they reach cousinship. The barrier between white and negro marriages is a purely social and economic, perhaps even political one, as is witnessed by the enormous number of mulattos and other hybrids in our country. There may or may not be sound biological reasons against the crossing of these or other races. Nature, at least, does not forbid them, as she does the crossing of species. Much less thoroughly ingrained are the barriers of religion and creed. Only a constant priestly domination checks the marriages of Hebrews with

Aryans, or Catholics with non-Catholics. The king may not marry his subject; the day labourer is not a welcome suitor for the hand of the millionaire's daughter; the common soldier may not even call upon the captain's family. Consider, further, all the numberless circumstances, such as duty to an invalid mother, ambition for a career, unwillingness to endure privation, disapproval of friends, which interfere transiently or permanently with mating.

But it will be observed and objected that all these are barriers and restrictions upon the mating instinct, not attempts to direct it in positive channels. We cherish the fond illusion that true love must always be "fallen into"; that it is a divine, and therefore imperious and not-to-be-disciplined impulse which directs, or should direct, human matings. Divine it surely is. But the divinest instincts are made more divine by the divine guidance of reason and consideration. Most of us are able to tell some, if not all, the reasons that guided us to the choice of our mates. Great classes of people have learned to direct their affections along certain definite parallels of taste and circumstances. In the old world, the wealthy plebeian's daughter instinctively loves a uniform, while the young officer as infallibly loves above the level of a six thousand dollar dowry. The penniless European count finds daughters of millionaires fascinating while a title is the finger of Providence which guides the longing heart of many a rich American's daughter. We middle-class Americans look at such domination of the affections with some cynicism. But in fact we are all guided positively by our more or less unconscious ideals in the opposite

sex, most of them, I fondly believe, loftier than those of rank and income. The ground for these observations from the eugenic standpoint is this:

Romantic love, the divinest of our passions, is not, purely, a blind, animal mating instinct, but the refinement of this instinct through age-long traditions of reason and sentiment and duty and aspiration. Some of these traditions have been deliberately created. Why is it, then, blasphemy of this divine instinct to propose to train it along the lines of duty to the coming race? Why should not the same tradition, which for the sake of the race, trains us to hesitate over marriage with cousins, lead us to incorporate into our ideals of a fit marriage the factors which will guarantee the best possible offspring, a perfected humanity?

XI

EUGENICS AND ECONOMICS

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MY shortcomings as a lecturer on eugenics are obvious to you all. The well-equipped eugenicist must be at once a biologist and a sociologist, and if I were to pose as a biologist, you would know that I was speaking under false pretences. At least, however, I can lay claim to a genuine and earnest sense of the profound importance of the teachings of eugenics. Three years ago, when I had the honour of an invitation to deliver the annual oration before the Louisiana State Medical Society, I chose as my subject the science and art of eugenics because of what seemed to me their overwhelming importance to human welfare and human progress.

The object of my present talk is to picture to you in a comprehensive way the subject and the purpose of eugenics and to arouse in your minds a just sense of its practical significance; and I may add that the study of eugenics is so interesting and so fascinating that it is wholly my fault if I do not succeed. Some of the problems of eugenics are highly controversial, but the most helpful attitude of mind is not usually that of the attorney for the prosecution or for the defence, and I shall try to speak about the character and aims of

eugenics, not in the form of one-sided argument, but of impartial exposition.

Every one is interested in eugenics because it deals with race progress and with parenthood which is the central fact in race progress. If we are all alert to the importance of the conservation of our natural resources, we are bound to be still more alert to the importance of the conservation of our people and of our race.

You are interested in eugenics, too, because you are interested in children. The word *eugenics* comes from the Greek word meaning *well-born*; and if sciences had mottoes, the motto of eugenics would be: For the Children's Sake. As young men who, I hope, are going to marry and have children before long, you have no deeper wish than that your children may be, both in mind and body, well-born. And what you want for your own children you want for all children. Out of this desire and this high sense of responsibility, as good parents, for your own sons and daughters grows your interest as good citizens in the well-bornness of all the children of the race.

The formal definitions of the science will mean more to you, perhaps, if I first ask you to consider for a moment a curious paradox. At the same time that we have been accustomed, as a matter of course, to look to heredity for the explanation of improvements in the breed of our domestic animals, we have been equally accustomed to look chiefly to the influence of environment and education for the improvement of our race of men. When you say, for example, that our domestic animals are far superior to those of by gone times, you mean that in their in-born qualities they are su-

perior at birth, but when you speak of the progress of the human race, most people have something quite different in mind. They think of this progress as a matter, not of heredity, but of better surroundings and better training. In other words, we have been neglecting the possibility of the improvement of the human race by better inheritance as well as by better environment. It is this neglect which has made possible the assertion that the infant of to-day is neither physically nor mentally superior to the infant of centuries ago.

Eugenics asks why we do not give at least as much consideration to the parentage of human beings as we give to that of our horses and our cows. Sir Francis Galton, who coined the word, defined eugenics as "the study of agencies under social control that may improve or impair the racial qualities of future generations, either physically or mentally." More simply, eugenics is "the science which deals with all influences that improve the inborn qualities of a race." It is the study of human and racial welfare in so far as this welfare depends on the inborn qualities of men and it leads to the "systematic endeavour to improve the nature of man." Dr. Futcher defined eugenics the other day as "the science of the improvement of the human race by better breeding," and Professor Keller calls it "the science of rearing human thoroughbreds."

Eugenics, then, deals with human progress. This progress is many-sided, and it may help us to place the science and the art of eugenics in their relation to other arts and sciences concerned with the progress of man if, before coming to closer quarters with our subject,

we pause for a moment to divide students of human progress into two groups, the biological and the social. On the one hand is the group of thinkers, like the biologists and the psychologists, who are devoting their lives to a study of the laws which explain the physical and mental development of individual human beings. On the other hand there is the group of thinkers,—students of morals and of religion, philosophers, jurists, historians, economists, sociologists, educators,—which looks to the first group for its data as to men biologically, and concerns itself with the inter-relation and inter-action and inter-dependence between men in society. The task of the biological group will not be achieved until all men and women have sound minds in sound bodies. The task of the sociological group will not be achieved until it has established right relations among men. As a pure science, eugenics lies wholly within the first group; but as an applied science or art—in its applications to human progress—it calls on the sociologist as well as the biologist. In this address I shall discuss separately the science and the proposed art of eugenics.

The investigators in this so-called new science—there is some question as to how far it is really new—are, then, a group of biologists engaged in the study of man and his progress from the same standpoint as that from which Darwin and his followers studied the lower species. At the same time, they are earnestly hoping to use their knowledge for the promotion of human welfare, and they offer some far-reaching advice which I shall discuss a little later. But, as investigators, they

are nothing more or less than biologists whose subject matter is the racial character of man.

They fully realise that their first effort must be to amass facts. The official statement of the Francis Galton Laboratory for National Eugenics, at the University of London, reads:

“It is the intention of the founder that the Laboratory shall serve

1. As a storehouse of statistical material bearing on the mental and physical conditions in man, and the relation of these conditions to inheritance and environment;
2. As a centre for the publication or other form of distribution of information concerning national eugenics;
3. As a school for training and assisting research workers in special problems of eugenics.”

The research workers of the Galton Laboratory have already published, among other papers, studies on “The Inheritance of Ability,” “The Inheritance of Psychological Characters,” “The Inheritance of the Insane,” and an interesting memoir entitled “The Promise of Youth and the Performance of Manhood,” which undertakes to trace the relation between success in the examinations for the B.A. Degree at Oxford and subsequent success in professional life. A “Treasury of Human Inheritance,” containing pedigrees of various types of intellectual ability, of tuberculous stocks, of epilepsy, physical depravity, and so on, has also been published; and the Director of the Galton Laboratory, Professor Karl Pearson, is also directing a series of “Studies in National Deterioration.” These publica-

tions, you will notice, aim to carry further the earlier studies of Galton on hereditary genius and natural inheritance.

In this country, the Eugenics Record Office (established three years ago at Cold Spring Harbor, New York, by the Eugenics Section of the American Breeders' Association) is undertaking a similar work. It "aims to fill the need of a clearing house for data concerning 'blood lines' and family traits in America." By means of correspondence, the acquisition of family records on special forms, and the inquiries of field workers investigating either in conjunction with institutions or independently, it seeks to accumulate and study the records of physical and mental characteristics of human families, and to educate the public as to classes of fit and unfit marriages.

If you are interested, the Eugenics Record Office will send you one of its blank schedules for the use of those who wish to preserve a record of their family histories.

Some of the publications of this Office are: studies on the heredity of feeble-mindedness, insanity, and epilepsy; "The Hill Folk," a report on a rural community of hereditary defectives; a handbook and guide for those who wish to do field work in eugenics; "The Trait Book," an attempt to catalogue human traits; and "The Family History Book," giving sample family histories and showing how they are prepared.

Investigators in eugenics are seeking to assemble any facts which may throw light on the hypotheses of Darwin and Mendel as applied to man, which tend to prove or disprove Weismann's (and Galton's) teach-

ing that acquired characters are not transmitted, or which tend to show whether children inherit the mental characters of their parents to the same degree as they inherit their physical characters. They are studying, too, the so-called racial poisons which, whether injurious or not to the individual who takes them are liable to injure his or her offspring. In a word, they are engaged in studying the laws of heredity as applied to man in all their aspects, and the influences of environment so far as they affect heredity.

In all this study they are not only asking the ways in which the physical and mental stamina of man are progressing or deteriorating and the laws of human development which explain this progress or retrogression; they are also "looking for light on human destiny." As Professor Karl Pearson says, they are asking "how a nation becomes physically and mentally more vigorous," and the influences which "can make" or "mar national life and racial character."

There can be no two opinions about the value of new light on questions of such moment. The earlier biologists dodged, to a considerable degree, the study of man. Thus we find Darwin writing Wallace in 1857: "You ask whether I shall discuss 'man.' I think I shall avoid the subject, as so surrounded with prejudices, though I fully admit it is the highest and most interesting problem for the naturalist." To-day investigations such as I have been describing may compel hap-hazard observation and vague speculation as to human development to give place to more exact knowledge. As yet we are "only on the threshold of such knowledge." We want the whole truth, both for its

own sufficient sake and because we recognise that, in the fine words of Mr. John Morley, "truth is no pale abstraction, but a vital force in human progress."

At the same time, however, we must constantly bear in mind the pitfalls of possible error in the acceptance and interpretation of the facts from which the laws of this biological science of mankind are to be deduced. While we engage to welcome, open-mindedly, whatever facts the investigators may bring, we must at the same time insist that the workers in eugenics be themselves open-minded. They must exercise the greatest care in the collection of facts. They must state the evidence fairly. They must not assume as facts hypotheses favourable to their conclusions; and they must guard both themselves and their followers against the temptation to put their best foot forward by claiming a little more than the facts warrant. Let me picture briefly two or three of these pitfalls.

One is the pitfall of an unduly simple application to man of conclusions reached from a study of lower forms of life. We are interested in the plant experiments of De Vries and Burbank, and in the prodigious successes of racehorses sired by Eclipse or Electioneer; and we are right in asking if these achievements have lessons for the human species. But the truth is quite as likely to be hindered as advanced by any rash generalisations from imperfect analogies of plant and animal breeding. Almost necessarily, biologists acquire their methods and training and habits of thought through study of forms of life below man. They are peculiarly liable, therefore, to underestimate the need of extreme caution in applying to man conclusions of

evolution in its application to the lower animals, and to be carried too far by incomplete analogies.

Do not misunderstand me here. My point is not at all that the fundamental influences of inheritance common to the lower animals and to man should be denied due recognition, but that due emphasis should also be given to the influences of the complex superstructure of society peculiar to man. It is not that very many conclusions from animals to man are not true, but that they represent only a part of the truth.

Again, there is the pitfall of an unwarranted use of the statistical method. The physician knows only too well the shortcomings of statistics concerning the physical and mental nature of man. He knows how difficult it is to collect vital statistics accurately, with just discrimination, and how easy it is in interpreting them to overstep the line between their use and their abuse. The investigators in eugenics praise nothing so much as their exact method, this method of statistics. We agree that vital statistics will be used to render far greater service than they do to-day; but such confidence must not blind us to the permanent limitations of the method of statistics in its application to individual men and women in human society.

Statistics are, at best, a crude method of knowing so highly differentiated and so elusive a creature as man; and there is no field concerning the development of man where statistics are more often inconclusive than the field of battle between the partisans of the influence of environment and the partisans of the influence of heredity. Here the same facts may often be interpreted either way, though in either case in-

conclusively, because of the impossibility of isolating the results of inheritance from the results of environment.

This brings me to one other pitfall which we should not overlook, namely, the very human temptation to exaggerate the importance of eugenics by explaining by inheritance characteristics of individuals that may equally well be accounted for by environment. The tone of some writers of the eugenic school does not altogether assure that they will collect and interpret statistics with all possible caution, nor that they will never attempt to make statistics prove conclusions regarding man which cannot be proved by statistics.

Some of us feel that Galton himself, in his famous volumes on "Hereditary Genius" and "Natural Inheritance," provides us with an example both of the misinterpretation of statistics and of the tendency to claim too much for the influence of inheritance, when he asserts that genius finds expression so inevitably that no adversity of circumstance can keep it down. With an assumption like this you might prove even Huxley's assertion that "an ounce of Heredity is worth a ton of education." Few of us question the large importance of human inheritance, but Galton's assumption that genius is irrepressible begs the whole question. We should be on our guard against the tendency of Galton's followers to make the same or similar assumptions.

I have tried to give equal attention to the truth and to the liability to error of eugenic investigations. We need to note the pitfalls; but it is still more necessary to note that the value of facts like those gathered in the Galton Laboratory and the Eugenics Record Office

is not diminished because this or that individual happens to misinterpret them.

Thus far we have considered eugenics as a science, concerning itself solely with the advancement of knowledge. Let us now turn to consider the problem of the application of this knowledge to human welfare. Earnest men like Galton and Pearson and their followers do not stop with asking what influences in human society are making for race progress and what influences are making for race decay. They go further and ask: In the light of this knowledge, what steps should an intelligent society take to prevent such deterioration and to promote such progress? And they believe profoundly that their knowledge entitles them to an important part in the direction of endeavours for the permanent advancement of the physical and mental powers of mankind. They propose, in a word, that society shall undertake, by every wise means in its power, to encourage parenthood of the fit and to discourage parenthood of the unfit. Recent writers on eugenics frequently classify its practical applications under two heads: "Constructive eugenics, or the endeavour to promote the multiplication of the more fit, and restrictive" (or negative) "eugenics, or the endeavour to diminish the numbers of the less fit."

By what means is society to approach these desirable results? By the gentle influence of public opinion or by the harsh prohibitions of positive law? The responsible leaders of this propaganda for applied eugenics are thoroughly moderate and sane in their choice between these means. It is grossly unfair to caricature them as relying chiefly, for the success of their

proposals, on the prohibitions of positive law. They see the difficulties suggested by the question, Who would be the legal judge capable of separating the fit from the unfit? They understand, as much as we do, that enforceable law must rest on a broad and firm foundation of public opinion. The suggestion of Galton that the State might subsidise wedlock of the exceptionally fit is not, you will note, a prohibition nor a compulsion, but a bounty dependent on voluntary choice.

The few legal prohibitions favoured by advocates of applied eugenics are such as apply only to those who, under any sane standards, are obviously unfit,—to idiots, insane, feeble-minded, and the most depraved criminals, in whom it seems hopeless to develop a sense of personal moral responsibility.

To men and women of these classes parenthood must be effectively and permanently denied. In the words of Mr. Winston Churchill, they deserve all that can be done for them by a Christian and scientific civilisation now that they are in the world, but their curse must die with them and not be transmitted to future generations. In self-protection, society owes it to the future to prevent these obviously unfit from bringing into the world others like themselves.

There are two and only two ways of preventing parenthood on the part of the hopelessly unfit,—the method of segregation and the method of sterilization. They must be segregated, or sterilized, or given their choice between freedom with sterilization and permanent segregation. I shall not undertake to discuss the relative advantages of these alternative methods. As writers on the subject have pointed out, individuals

whose chief menace to society is their capacity for propagating their kind might be safely at large, if rendered sterile; and sterility may be for them a very desirable alternative to permanent confinement. But unless they are sterilized, individuals of these classes must be subjected to kindly but permanent segregation as long as they are capable of procreation.

Fortunately, such segregation is usually also warranted (as Dr. A. M. Gossage has said) on other than eugenic grounds. The feeble-minded, for example, are better and happier when kept under proper control in institutions, and the majority of these classes of incapables and criminals are a constant public menace and expense while at large.

The only effective alternative to segregation of these hopeless degenerates is their sterilization. Eight American States have laws authorising or requiring sterilization of certain classes of defectives and degenerates, and other States are considering the passage of similar laws; but except in Indiana and California these laws have not yet been seriously carried into effect.

Speaking of sterilization by the present method of vasectomy, Dr. R. R. Rentoul says, this operation "is very simple, practically painless, makes no difference at all to the bodily functions, and has no ill effects of any kind. It prevents nothing but the power to procreate. It is the outcome of modern scientific knowledge, and must not be confounded with the older and much more drastic methods." (Eugenics Review, II, 74-76.)

Mr. Bleeker van Wagenen, chairman of the committee on the Eugenics Section of the American Breeders' Association to study and report on means of pre-

venting the multiplication of defectives, and degenerates, states:

" 1. That the sterilization of the adult male by vasectomy is a simple, practicable method of preventing procreation by him, without otherwise interfering with his sexual functions, but that it is not certainly permanent in this respect.

" 2. That sterilization of the adult female — is never wholly free from danger to life or disturbance of other bodily and mental functions. Modern surgery and hospital care have greatly reduced these dangers, but they still exist."

In California, the sterilization law was introduced in 1909. The persons subject are the inmates of state hospitals and homes for the feeble-minded and inmates of state prisons committed for life, or showing sexual or moral perversion, or twice committed for sexual offences, or three times for other crimes. Under this law, 220 persons have been operated on, of whom 94 were women. They seem to have been taken exclusively from the state hospitals for the insane. Compulsory powers were rarely enforced, as it was decided in all cases to obtain beforehand the consent either of the relatives or of the patient, if sound enough mentally to form a reasonable judgment.

Indiana led the way in this type of legislation in 1907. The Indiana act is entitled "an act to prevent procreation of confirmed criminals, idiots, imbeciles, and rapists." The motive of the State in this enactment is purely eugenic. The act provides that "Whereas, Heredity plays a most important part in the transmission of crime, idiocy, and imbecility," (1) Each institution of the State entrusted with the care

of confirmed criminals, idiots, rapists, and imbeciles shall appoint upon its staff, in addition to the regular institutional physician two skilled surgeons. (2) If, in the judgment of this committee of experts and the board of managers, procreation is inadvisable and there is no probability of improvement of the mental and physical condition of the inmate, it shall be lawful for the surgeons to perform such operation for the prevention of procreation as shall be decided safest and most effective. But this operation shall not be performed except in cases that have been pronounced unimprovable.

Dr. H. C. Sharp writes: "As to the workings of this law in the State of Indiana, I must say that they have been most satisfactory. Our commission has been very careful in its selection of men who come under the provisions of this law beyond question. However, in many instances we have operated on many against their will and over their vigorous protest; but in every instance, in the course of a few months following, they have either communicated to me verbally or by writing their hearty approval of the operation . . .

" . . . After the vas deferens has been severed you may by a second operation repair it and re-establish the original function.

"Since October, 1899, I have been performing an operation known as vasectomy. . . . This operation is indeed very simple and easy to perform. I do it without administering an anæsthetic, either general or local. It requires about three minutes' time to perform the operation, and the subject

returns to his work immediately, suffers no inconvenience, and is in no way impaired for his pursuit of life, liberty, and happiness, but is effectively sterilized. I have been doing this operation for nine full years. I have 236 cases that have afforded splendid opportunity for post-operative observation, and I have never seen any unfavourable symptom. . . . There is no disturbed mental or physical condition following, but, on the contrary, the patient becomes of a more sunny disposition, brighter of intellect, . . . and advises his fellows to submit to the operation for their own good.

“And here,” Dr. Sharp goes on to say, “is where this method of preventing procreation is so infinitely superior to all others proposed — that it is endorsed by the subjected persons. All the other methods place restrictions — and therefore punishment — upon the subject; this method absolutely does not. There is no expense to the State, no sorrow or shame to the friends of the individual, as there is bound to be in the carrying out of the segregation idea.”

I want to emphasise the fact that it is not doubtful, border-land, cases which we are discussing here, but cases where the need of sterilization or segregation is unmistakably clear. Mr. John Haines, writing on *The Degenerates*, cites the case of one (English) workhouse in which sixteen feeble-minded women gave birth to one hundred and sixteen children.²

“Few realise how pitifully inadequate is society’s protection of the feeble-minded. The New York State Board of Charities says in its last report:

² Cited in the *Eugenics Review*, IV, 212.)

'There are about 30,000 feeble-minded persons in the State of New York, of whom 4,000 are intermittently sequestered, while 26,000, who are a menace to society, are at liberty and may reproduce the unfit.'

"Then follows a chart of one pair of these 'at liberty,' showing eleven offspring, *one* of whom, a daughter, gave birth to ten children. The fertility of the others is not shown. Every one surviving of those twenty-one children was feeble-minded.

"Says the last Massachusetts report:

'We have been obliged to refuse a very large number of applicants for the admission of feeble-minded women—many of whom have given birth to one or more children. . . . The prolific progeny of these women almost without exception are public charges from the date of their birth.'"³

In the face of facts like these and facts derived from studies on the "Jukes," the "Hill Folk" and the "Nam Family," and in the face of the knowledge that society has it in its power very greatly to diminish the number of defectives and degenerates in the next and succeeding generations, we can not continue to shirk our duty of preventing the multiplication of the certainly unfit.

While I have wanted to give you a clear understanding of these methods of negative or restrictive eugenics, at the same time I earnestly ask you not to carry away the mistaken impression that eugenics is solely or chiefly concerned with these legal prohibitions which would reach only a small fraction of the population.

³ (Quoted from Seth K. Humphrey, "Parenthood and the Social Conscience," *The Forum*, April, 1913.)

The proposed social control of marriage and of parenthood is to be chiefly a control through the pressure — conscious or unconscious, and far better if unconscious — of public opinion. The heart of the science of eugenics is the relative importance of nature and nurture. The heart of the art of eugenics is the answer to the question: How far is it possible for a body of thoughtful men, with an earnest conviction of the value of their eugenic teaching, to influence the formation and growth of a public opinion powerful enough to encourage parenthood of the fit and to discourage parenthood of the unfit? The problem of applied eugenics, then, is almost wholly a problem in the guidance of public opinion.

While, as I have just said, the leaders in the practical proposals of eugenics are thoroughly sane in their reliance on public opinion rather than on law, some of them are not so sane, perhaps, in their sanguine faith that this body of opinion may somewhat readily be created. When advocates of eugenics permit themselves to see visions of the rapid ascendancy of patriotic eugenic opinion — nay, even of a eugenic religion — they show a quite inadequate understanding of how the compulsion of public opinion and the sanctity of religion are born and grow strong. A public opinion insistent enough to exercise a large degree of control over marriage and parenthood, over the most fundamental experiences of life, must necessarily follow only slowly, after a world of sane and patient effort. Man is not wholly a rational animal, and controlling opinions and religions do not rest on rational considerations alone,

however sound these may be, but on the outcome, also, of age-long experiences of pleasure and of pain.

Consider again the magnitude of the task which the advocates of eugenics set public opinion to do — a task compared to which Mr. Roosevelt's propaganda against race suicide is an easy and modest proposal. For Sir Francis Galton and his followers ask not only that the fit marry the fit and have larger families, but that the pressure of public opinion become so controlling that unfit individuals would be influenced to deny themselves children at all. To a large group of the people of our generation such opinion would appear in direct opposition to self-interest. None the less, the advocates of eugenics set themselves the task of converting a public opinion which permits the evils they combat into a public opinion which will restrain them.

They would establish chairs of eugenics in the universities. They would have every agency which influences ideals work to arouse in men a pride in their organic inheritance of good physical, mental, and moral stamina — a pride greater even than that men take to-day in their inheritance of the external circumstances of wealth or of conventional social position. At the same time they would have us work for the further growth of that individual sense of moral responsibility on which all our progress — moral, political, and industrial — has depended, until it includes a keen sense of the individual responsibility of each human being for the organic soundness of the generations yet to come.

I would not belittle the difficulties of the task; but

neither would I have them appear more insurmountable than they are.

Choice in marriage is now, and always has been, in all stages of civilisation, very largely restricted by public opinion. We have only to think of the power of opinion in making effective monogamy, or the narrow limits of royal marriages, or the restriction of marriage within the prohibited degrees, or the curious and intricate taboos of the low Australian tribes. The pressure of such opinion, indeed, is so customary and so accepted as a matter of course that it is not often felt as a hardship, and usually not felt at all. The problem, therefore, is not the creation of control of marriage by public opinion. It is rather the substitution of a more wholesome opinion for a less wholesome one — the elevation of existing opinion where it is at present unsound, and the strengthening of existing opinion where it is already sound.

In the words of Major Leonard Darwin, "Affection should no doubt always point the path to marriage. But, though we often seem to act on the pure impulse of the moment, yet in reality our actions are ever in large measure the result of all those innumerable impulses in the past which have been instrumental in moulding our minds and informing our characters. Our affections in their earlier stages are, therefore, largely guided by our preconceived ideas."

Much is even now being done, and more can be done in the immediate future, to promote intermarriage between sound men and sound women, and perhaps — though this is less certain — to influence them to have larger families.

But, granting that society can do much to promote marriage and parenthood among the fit, can it be successful also in restricting parenthood among the unfit? Among the unsound there has always been an honourable minority of men and women who denied themselves the great happiness of children because their sense of their responsibility was too high to allow them to take the risk of transmitting to their children the weaknesses of their own constitutions. Wise education of public opinion would add largely to the numbers of this honourable minority.

There still remain the classes of the unfit who would probably marry and have children just the same. If any task could be more difficult than to determine at what point to draw the line between the fit and the unfit and to determine who would fall below this line of minimum fitness for parenthood, it would be the task of persuading the individual that the decision that he was unfit was just. And if he were persuaded, how generally could public opinion drive home a sense of responsibility firm enough and constant enough to lead him to forego children? But where the unfit continue to marry and have children, the desired result — fewer children of the unfit — may still be reached, indirectly and more slowly, by the influence of ideals of sound marriage. As Professor Irving Fisher points out in his wonderfully sane and comprehensive "Report on National Vitality," if a considerable percentage of the population once shall come to regard vitality as an essential endowment, healthy persons will marry, chiefly, healthy persons; and unhealthy persons, in so far as they marry at all, will do so among themselves. The

necessary consequence will be that the number of children of unhealthy couples will decrease, especially after the first generation.

And Professor Fisher concludes: "It would be folly, of course, to expect any change in ideals so complete that there would not be numerous exceptions to hygienic mating, but, once the bulk of mankind are guided by a truer principle in forming marriages, the effect on racial development will make itself distinctly felt within a generation."

The worst criticism that can be levelled against these eugenics proposals is that their results will be slow. But so is the progress of civilisation slow. When we consider the few years since the beginning of any systematic and wide-spread eugenic effort, and the difficulties in the way, the striking fact is that so much progress has already been achieved. Investigations in human heredity are being carried on as never before. Students are being offered instruction in the subject at many universities. Eugenics societies are at work in England, in the United States, and in the continental countries. An International Eugenics Congress was held a year ago. The Eugenics Review is in its fifth year. The newspapers are discussing eugenic ideals and eugenic methods.

Last year the Dean of the Episcopal Cathedral of Chicago (the Rev. W. T. Sumner) "announced that the clergymen of that Cathedral would not marry any couples unless they were able to produce a certificate, signed by a reputable physician, declaring that both parties were physically and mentally equipped to contract marriage"; and this requirement was widely en-

dorsed both by other clergymen and by laymen. A requirement like this not only makes it possible for the clergyman "to avoid solemnising the marriages of persons suffering from venereal disease" but also makes it impossible for a person "to contract a marriage without having his attention directed to his or her fitness to do so."

I do not think that any observer of American life will disagree with me when I say that there is already a marked tendency among the young men and women of this country to look more carefully than they used to do to the physical and mental fitness of those whom they choose as their husbands or their wives.

Finally, we are breaking up the "conspiracy of silence" and making progress in the difficult and delicate problem of instruction in sex hygiene and race hygiene.

In the great work for the upbuilding of a sound and powerful public opinion, all thoughtful and earnest men must co-operate.

The students of eugenics, and all biologists, have their important part to perform. We need not pause to ask how far the teachings of Galton and his followers are new. The apostles of eugenics delight overmuch, I think, in picturing their science as a thing apart, and in emphasising what they add rather than what they borrow from earlier thought,—from the proposals of Plato, from the actual régime of ancient Sparta, and from a considerable group of later thinkers. What is new is less important than what is true; and originality is often a poor thing. Neither need we dwell on their tendency to belittle the achievement and helpfulness of workers for human progress in other

fields,— a pastime of which some of them are overfond.

Such individual vagaries are of trivial importance; they can do no permanent harm. They may amuse us for a moment, but they should not divert our minds from the essential fact that the leaders in eugenics have seized a fortunate moment to hasten our entrance into a wholesome period of unbiased investigation of the laws of heredity as applied to man. They offer us the outlines of a plan of research and of a proposal for the education of public opinion which promise to be fruitful both in knowledge and in human character. It would be wholly unfair to ask that the investigators of the Galton Laboratory and the Eugenics Record Office show any considerable results so soon. We may expect them to do more, but already we are their debtors because they have centred our attention, in a striking way, on the need of the knowledge they are seeking and on the value of the services it may later render.

All the students of society, too, in whatever field, must contribute their share toward the establishment of a sounder public opinion. "Eugenics must pass from science into practice." The success of the eugenic movement depends no less upon the effective utilisation of the knowledge we already have than upon the acquisition of new knowledge. It is as essential that the truth concerning race improvement through heredity shall influence the many as that it be discovered by the few. When the advocates of eugenics enter the field of practical proposal, they must join hands with all good citizens who are seeking the wisest means for promoting better relations among men, if they are to

gain for their teachings the widest and deepest influence on human conduct.

At the outset of this talk I suggested a contrast between the work of the sociologist and the work of the biologist. But the essential point is that they do not compete, but co-operate. In the intellectual division of labour each approaches the central question of the progress of man with an inevitably lop-sided equipment, and each must have the help of the other.

I like to think of the science and art of eugenics, and you will like to think of them, not as something aloof, but as important aspects of a large and richer whole, as parts of a group of movements united in seeking one noble common end, as parts of a work which will prove, I believe, to be the one contribution of this generation most potent for the good of all the generations which are to come. I refer to our effort to conserve and to increase our national health and our permanent national vitality.

To you individually, the largest significance of this effort is that you are so fortunate as to be permitted to have a part in it, both as parents and as citizens. Your own personal sense of race responsibility does not need to wait on that of others. As prospective ancestors, you will not forget that while it is essential, it is not enough that you be fit. You must take care that the mother of your children is equally sound. If the Adams's, for example, have preserved the vigour of their family stock and remained an exceptionally able family through five generations, it is no more because the men were able than because they have shown wisdom in the choice of their wives.

At the same time, as citizens, you want to be one of those who help to make more general and more real this feeling of responsibility for the children and for the generations yet to come.

The problem of eugenics is twofold: To know the truth about the influence of inheritance, and to apply this truth to the benefit of the future generations of our race. The goal is high; the certainty that it is also distant should not daunt us. It is enough that we know that public opinion, based on sound eugenic teaching can do much, and that how much it will do depends on each individual one of us. The citizen who performs his part in the formation of this public opinion will be content if he will learn of nature the lesson of quiet work:

“One lesson of two duties kept at one,
Though the loud world proclaim their enmity —
Of toil unsevered from tranquillity;
Of labor, that in lasting fruit outgrows
Far noisier schemes, accomplished in repose,
Too great for haste, too high for rivalry.”

XII

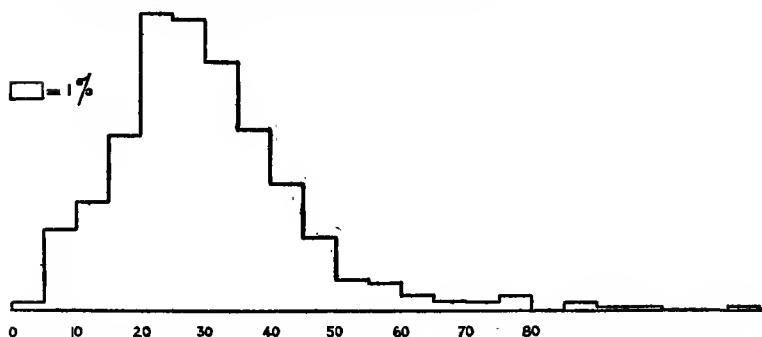
EUGENICS: WITH SPECIAL REFERENCE TO INTELLECT AND CHARACTER

EDWARD L. THORNDIKE

BY eugenics is meant, as you all know, the improvement of mankind by breeding. It has been decided by those responsible for this lecture that its topic shall be the intellectual and moral, rather than the physical, improvement of the human stock.

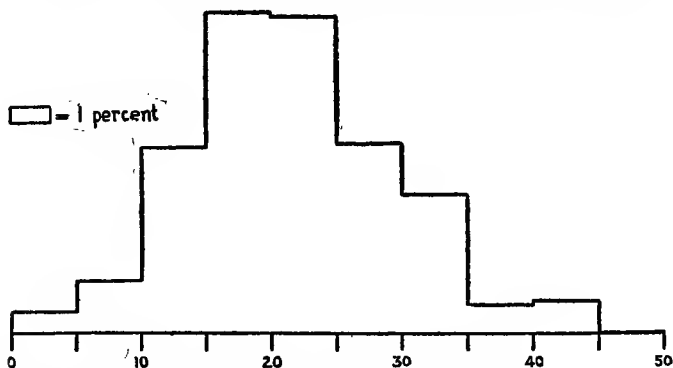
Common observation teaches that individuals of the same sex and age differ widely in intellect, character and achievement. The more systematic and exact observations made by scientific students of human nature emphasise the extent of these differences. Whether we take some trivial function — such as memory for isolated words, or delicacy of discrimination of pitch — or take some broad symptom of man's nature, such as his rate of progress through school, or ability in tests of abstract intellect, or even his general intellectual and moral repute — men differ widely. Samples of the amount and distribution of such differences are given in Charts 1, 2 and 3. Chart 1 relates that of 732 children who had studied arithmetic equally long, one could get over a hundred examples done correctly in fifteen minutes, while others could not get correct answers to five. Even if we leave out of account the top three per cent., covering all the records of 60 or over,

we have some children achieving twenty-five times as many correct answers as other children.



Examples done correctly in 15 minutes.

CHART 1. THE RELATIVE FREQUENCIES OF DIFFERENT DEGREES OF ABILITY IN ADDITION IN THE CASE OF FOURTH-GRADE PUPILS.



Gain made in examples done correctly in 10 minutes

CHART 2. THE RELATIVE FREQUENCIES OF DIFFERENT AMOUNTS OF GAIN FROM FIFTY MINUTES OF PRACTISE IN DIVISION, IN THE CASE OF PUPILS OF THE SAME SCHOOL GRADE.

Chart 2 shows that when four hundred children who had had similar school training were given each the same amount of practice in certain work in division,

some improved not at all, and others enormously. Chart 3 shows that of children in the same city all of the same year-age (thirteen), some have done the work of the eight grades of the elementary school and of one or two years of the high school, while others have not completed the work of a single year. Still less competence at intellectual tasks could be found by including children from asylums for imbeciles and idiots.

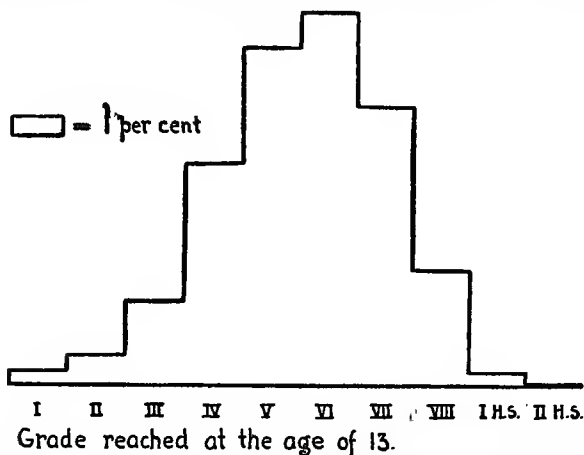


CHART 3. THE RELATIVE FREQUENCIES OF DIFFERENT AMOUNTS OF PROGRESS IN SCHOOL OF THIRTEEN-YEAR-OLD CHILDREN.

The differences thus found amongst individuals of the same sex and age are due in large measure to original, inborn characteristics of the intellectual and moral constitutions of the individuals in question. They are, it is true, in part due to differences in maturity — one thirteen-year-old being further advanced in development than another. They are also due in part to differences in environment, circumstances, training — one sort of

home-life being more favourable than another to progress through school, for example. Each advance in the study of individual differences, however, shows that differences in maturity and differences in the circumstances of nurture account for only a small fraction of the differences actually found in individuals of the same general environment of an American city in 1900-1912. Long before a child begins his schooling, or a man his work at trade or profession, or a woman her management of a home — long indeed before they are born — their superiority or inferiority to others of the same environmental advantages is determined by the constitution of the germs and ova whence they spring, and which, at the start of their individual lives, they *are*.

Of the score or more of important studies of the causes of individual differences which have been made since Francis Galton led the way, I do not find one that lends any support to the doctrine of human initial equality, total or approximate. On the contrary, every one of them gives evidence that if the thousand babies born this week in New York City were given equal opportunity they would still differ in much the same way and to much the same extent as they will in fact differ.

We find, for instance, that the children of certain families rank very much higher in certain psychological tests of perception, association and the like, than the children of certain other families. Now if this difference were due to the difference between the two groups of families in environment — in ideals, customs, hygienic conditions and the like — it should increase greatly with the age of the children in some rough pro-

portion to the length of time that they are subject to the beneficent or unfavourable environment. It does not. One family's product differs from another nearly as much at the age of 9 to 11 as at the age of 12 to 14.

Again, if inequalities in the environment produce the greater part of these differences, equalising opportunity and training should greatly reduce them. Such equalisation is found by experiment to reduce them

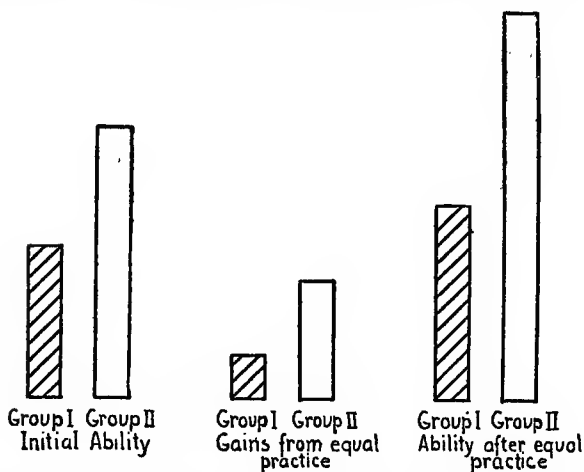


CHART 4. THE RELATION OF THE GAINS FROM EQUAL AMOUNTS OF PRACTISE IN THE CASE OF INDIVIDUALS OF HIGH AND LOW INITIAL ABILITY.

very little, if at all. Chart 4 shows, for example, the result of equal amounts of training applied to two groups of adults whom life in general had previously brought to the conditions shown at the left of the chart. The trait chosen was addition; from life in general one group had gained the ability to do twenty-seven more additions per minute than the other group, accuracy

being equal in the two groups. At the end of the special training the superior individuals had gained on the average 28 additions per minute, while the inferior individuals gained only 10 additions per minute. As a result of this partial equalisation of opportunity, the superior individuals were farther ahead than ever! If equality of opportunity has no equalising effect in so easily alterable a trait as rapidity in addition, surely it can have little power in such traits as energy, stability, general intellectual power, courage or kindliness.

Men differ by original nature. With equal nurture of an inferior sort they progress unequally to low stations; with equal nurture of a superior sort they progress unequally to high stations. Their absolute achievements, the amounts of progress which they make from zero up, are due largely to the environment which excites and directs their original capacities. Their relative achievements — the amounts of progress which they make, one in comparison with another — are due largely to their variations one from another in original capacities.

The man's original nature, too, has large selective power over his environment. The thousand babies will in large measure each create his own environment by cherishing this feature and neglecting that, amongst those which the circumstances of life offer. As Dr. Woods has well argued, the power of the environment to raise or lower a man is very great only when the environment is unavoidable. We must remember that one of these babies, if of mean and brutal nature, can by enough pains avoid industry, justice and honour, no matter how carefully he is brought up; and that one

of them of intellectual gifts can, if he cares enough, seek out and possess adequate stimuli to achievement in art, science, or letters, no matter how poor and sordid his home may be.

If, a hundred years ago, every boy in England could have had as good opportunity — each of the sort fitted to his capacities — as Charles Darwin had, the gain for human welfare would probably have been great; but if every boy then could have had as good inborn capacity for science, art, invention, the management of men — or whatever his strongest capacity was — as Charles Darwin had for science, the gain for welfare would certainly have been enormous.

The original differences in intellect, character, and skill which characterise men are related to the families and races whence the individuals spring. Each man's original mental constitution, which so largely determines how much more or less he will do for the world's good than the average man of his generation, is the product of no fortuity, but of the germs of his parents and the forces which modify the body into which they grow — is the product, as we are accustomed to say, of heredity and variation. The variation within the group of offspring of the same parents is large — a very gifted thinker may have an almost feeble-minded brother — but the variation between families is real. A feeble-minded person's brothers will be feeble-minded hundreds of times as often.

The general average tendency of the original intellectual and moral natures of children to be like the original natures of their ancestry is guaranteed beforehand by the accepted principles of biology. Direct evi-

dence of it is also furnished by investigations of the combination of original and acquired differences which human achievements, as they stand, display. The same studies which find differences of nurture hopelessly inadequate to account for differences of ability and achievement, find that original capacities and interests must be invoked precisely because achievement runs in families, and in a manner or degree which likeness in home training can not explain. Galton found that the real sons of eminent men had a thousand times the ordinary man's chance of eminence and far excelled the adopted sons of men of equal eminence. Woods has shown that, when each individual is rated for intellect or morals, the achievements of those sons of royal families who succeeded to the throne by paternal death and thus had the special attention given to crown princes and the special unearned opportunities of succession, have, in the estimation of historians, been no greater than those of their younger brothers.

Children of the same parents resemble one another in every mental trait where the issue has been tested, and resemble one another nearly or quite as much in such tests as quickness in marking the A's on a sheet of printed capitals or giving the opposites of words, to which home training has never paid any special attention, as they do in adding or multiplying, where parental ambitions, advice and rewards would be expected to have much more effect, if they have any anywhere.

Mr. Curtis, who has been assiduously studying the details of ability in arithmetic in school children, finds, as one sure principle of explanation, the likeness of children to parents — and this even in subtle traits and

relations between traits, of whose very existence the parents were not aware, and which the parents would not have known how to nurture had they known of their existence.

Dr. Keyes has recently made an elaborate study of various possible causes of the rate of progress of a child through the elementary school. He traces the effects of defective vision, of sickness, of moving from one school to another, and so on, but finds nothing of great moment until he happens to trace family relationships. Then it appears that certain families are thick with "accelerates," or pupils who win double promotions, whereas other families are thick with retarded pupils, who require two years to complete a normal year's work. Of 168 families, only 30 contain both an "accelerated" and a "retarded" pupil, whereas 138 show either two or more accelerates or two or more retarded pupils. The differences in home training are here not allowed for, but, in view of what has been found in other cases, it appears certain that the rate at which a child will progress in school in comparison with his fellows is determined in large measure before he is born.

In intellect and morals, as in bodily structure and features, men differ, differ by original nature, and differ by families. There are hereditary bonds by which one kind of intellect or character rather than another is produced. Selective breeding can alter a man's capacity to learn, to keep sane, to cherish justice or to be happy.

Let the lines L_1H_1 and L_2H_2 in Chart 5 be identical scales for the original capacity for intellect, or

virtue, or any desirable human trait. Let the surface above line L_1H_1 represent the distribution of this original capacity amongst men to-day. There is every reason to believe that wise selective breeding could change the present state of affairs, at least to that shown above L_2H_2 , within relatively few generations. Perhaps it

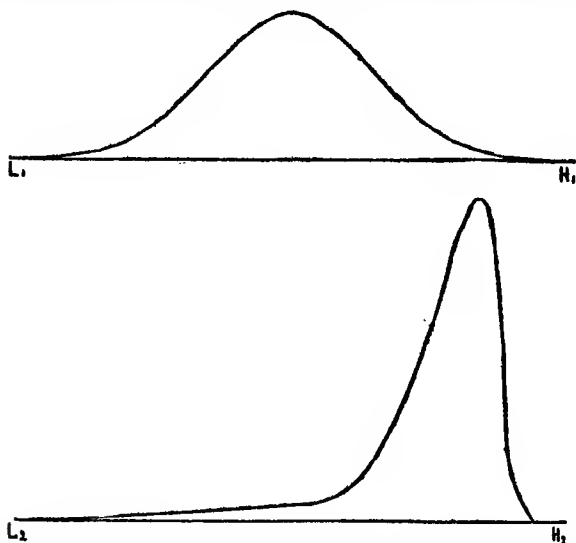


CHART 5. THE IMPROVEMENT POSSIBLE BY SELECTIVE BREEDING. The upper surface being taken to represent the existing distribution of intellect, the lower surface represents what might be expected from, say, ten or twenty generations of breeding exclusively from the apparently best tenth of human intellects.

could do even more. There is every reason also to believe that each step of improvement in the original nature of man would, in and of itself, improve the environmental conditions in which he lives and learns.

So much for the general possibility of eugenics in the case of intellect, morals and skill — for what should

soon be in every primer of psychology, sociology and education, and be accepted as a basis of practise by every wise family, church and State.

The next question concerns the *extrinsic* effects of selective breeding for intellect or for morals, the possibility of injuring the race indirectly, by a change in, say, intellect, which in and of itself is desirable. If we breed horses for speed, they are likely to lose in strength and vigour; do we run such risks in breeding men for intellect, or for morals, or for skill? This question has been neglected by the hortatory type of enthusiasts for eugenics. It has also not received the attention which it deserves from the real workers for racial improvement, probably because the psychological investigations which answer it are little known. They do, however, give a clear and important answer — that there is practically no chance whatever of injury from selective breeding within a race for intellect, or for morality, or for mental health and balance, or for energy, or for constructive ingenuity and skill — no risk that the improvement of any one of these will cause injury to any other of them, or to physical health or happiness. The investigations have found that, within one racial group, the correlations between the divergences of an individual from the average in different desirable traits are positive, that the man who is above the average of his race in intellect is above rather than below it in decency, sanity, even in bodily health. Chart 6 shows, for example, the average *intellect* of each of the groups, when individuals are graded 1, 2, 3, 4, etc., up to 10 on a scale for *morality*, according to Woods's

measurements of royal families. I may add that the effect of chance inaccuracies in Woods's ratings, whereby one individual is rated as 8 or 10 when he should have been rated 9, or is rated 4 or 8 when he should have been rated 6, is to make this obtained

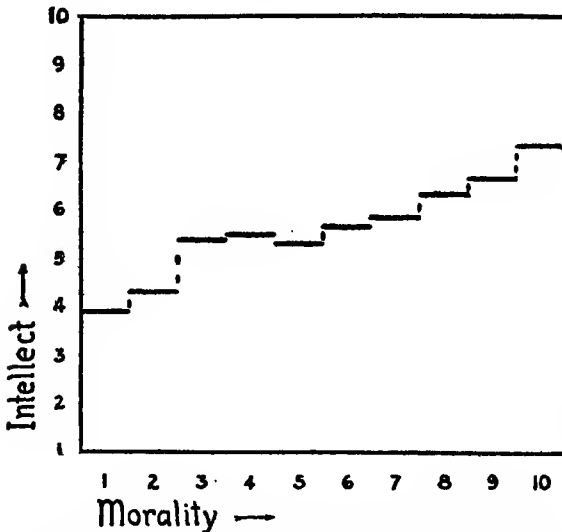


CHART 6. THE RELATION BETWEEN INTELLECT AND MORALITY IN EUROPEAN ROYAL FAMILIES. After Woods.

and shown relation of intellect to morals *less close* than it really is.

Nature does not balance feeble-mindedness by great manual dexterity, nor semi-insane eccentricities by great courage and kindness. Correlation of divergences up or down from mediocrity is the rule, not compensation. The child of good reasoning powers has better, not worse, memory than the average; the child su-

perior in observation is superior in inference; scholarship is prophetic of success out of school; a good mind means a better than average character. The fifty greatest warriors of the world will be above the average man as poets. The fifty greatest artists of the world will be better scientists than the average. Genius of a certain type does, *via* the nervous temperament, ally itself to eccentricities of a certain type; and very stupid men can not be rated as insane because they are already idiots; but on the average the most intellectual tenth of the population would, under equal conditions of strain, furnish fewer lapses into insanity than its proportional quatum.

Selective breeding for superior intellect and character does not then require great skill to avoid injurious by-products or correlatives of intrinsically good traits. *Intrinsically good traits have also good correlatives.* Any method of selective breeding, then, which increases the productivity of intellectually or morally good stock over that of poor stock, will improve man, with one possible added requirement — that breeding should be for fertility as well, should not be suicidal, should not make the race better but at the same time put an end to it altogether!

It might be that there was a necessary inverse correlation in human nature between fecundity and high intellectual and moral station whereby, the better men became, the fewer offspring they would have; and whereby, at a certain limit of super-manhood, reproduction would cease. Certain changes of the birth-rate with time, and certain variations in it amongst groups, have given some students the impression that intellect,

at least, is, by natural necessity, inversely correlated with fecundity.

It is hard to find the facts by which to either verify or refute the notion, current in superficial discussions of human nature and institutions, that such is the case. Sad testimony to man's neglect of the question which of all questions perhaps concerns him most — the simple question of which men and women produce the men

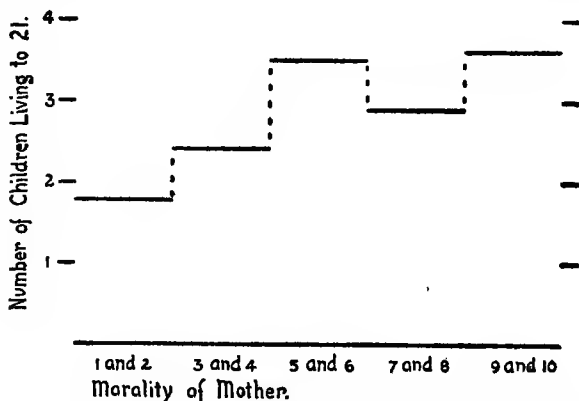


CHART 7. THE RELATION OF MORALITY OF MOTHER TO NUMBER OF CHILDREN.

and women of the future — is given by the fact that almost no clear and reliable evidence is available concerning the relations of fecundity to intellect, morality, energy, or balance. The most significant evidence is that collected by Woods in the case of royal families. Woods gives the number of children living till 21 in the case of each individual of the royal families which he studied. From them I have made the summaries noted on Charts 7 and 8. Each of these sets

of facts is of course the result of the constitutional fecundity of the women in question plus certain very intricate co-operating circumstances; and neither can be taken at its face value. What the birthrate would have been had the constitutional capacity of each woman worked under equal conditions, can only be dubiously inferred. My own inference from relevant facts concerning the studies of differentiated birthrates with

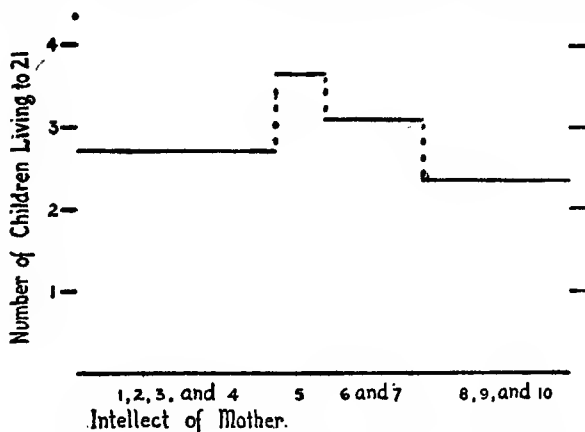


CHART 8. THE RELATION OF INTELLECT OF MOTHER TO NUMBER OF CHILDREN.

which I am acquainted is that morality, mental health, energy, and intellect perpetuate a family, and that wherever the *really* better, or saner, or stronger, or more gifted, classes fail to equal the really worse, ill-balanced, feeble or stupid classes, it is a consequence of unfortunate circumstances and customs which are avoidable and which it is the business of human policy to avoid. Society may choose to breed from the bottom, but it does not have to.

No great ingenuity or care then seems necessary to make fairly rapid improvement in the human stock. The task is only the usual one of any rational idealism — to teach people to want a certain thing that they ought to want, and to change social usages so as to satisfy this new want. The same sort of tuition whereby men are learning to want those who are alive with them to be healthier, nobler and more capable, will serve to teach us to want those who are to live with our children's children to be healthier, nobler and more capable. Provided certain care is taken to favour the sane, balanced type of intellect rather than the neurotic, any selective breeding which increases the fecundity of superior compared to inferior men, and which does not produce deterioration in the physical and social conditions in which men live, will serve.

The danger of deterioration in physical and social conditions from breeding for intellect and morals is trivial. The effect is almost certain to be the opposite — an improvement in physical and social conditions. The more rational the race becomes, the better roads, ships, tools, machines, foods, medicines and the like it will produce to aid itself, though it will need them less. The more sagacious and just and humane the original nature that is bred into man, the better schools, laws, churches, traditions and customs it will fortify itself by. There is no so certain and economical a way to improve man's environment as to improve his nature.

Each generation has of course to use what men it *has* to make the world better for them; but a better world for any future generation is best guaranteed by making better men. Certain worthy customs of present civ-

ilisation may be endangered by rational control of who is to be born, though this seems to me unlikely. In any case, we may be sure that if the better men are born they will establish better customs in place of those whose violation made their birth possible.

It is not by a timid conservatism sticking to every jot and tittle of the customs which gifted men of the past have taught the world, that we shall prevent back-sliding: it is far safer to trust gifted men of the present and future to keep what is good in our traditions, and to improve them. The only safe way to conserve the good wrought by the past is to improve on it.

It is beyond the province of this lecture to devise biologically helpful and socially innocuous schemes of selective breeding, but I may be permitted to record my faith that if mankind to-day really wanted to improve the original nature of its grandchildren as much, say, as it wants to improve the conditions of life for itself and its children, and believed certain facts of biology and psychology as effectively, say, as it believes that wealth gives power or that disease brings misery, appropriate schemes for selective breeding would be devised well within the span of our own lives.

Any form of socially innocuous selective breeding will improve the stock by reproducing from those members of it who have shown, by ancestral and personal achievement, with due allowance for favourable or unfavourable circumstances, the superiority of the germ plasm which they bear. But some forms may be far more effective than others according to the way in which the original components of intellect, character, energy, skill, stability, and the like in the germs are

constituted. Suppose, for example, that the original germinal basis for human intellect consisted in the presence of a certain constant something, call it " I_n , the determiner for intellect," in the germ or ovum. The fertilised ovum, which is the human life at its beginning, could then have I_n double, if both the germ and ovum had it; I_n single if one or the other had it; or could lack I_n , as it must if neither had it. Suppose that the consequences of these three conditions were that the $I_n I_n$ individuals would tend, with fair conditions in life, to be specially gifted; that the I_n individuals would tend to be of "normal" intellect; that the individuals lacking I_n would tend to be feeble-minded. It is then the case that of the germs produced by the individual who had $I_n I_n$ at the start of his life, each contains I_n , that of the germs produced by the individual who had I_n at the start of his life, half have I_n and half lack it, and that of the germs produced by the individual who lacked I_n at the start of his life, no one has I_n . Consequently, by discovering the individuals who lacked I_n at the start of life and preventing them from breeding, we could rapidly reduce feeble-mindedness. By discovering the individuals who had $I_n I_n$ at the start of life and breeding exclusively from them, we could eradicate feeble-mindedness and ordinariness both, leaving a race of only the specially gifted. The discovery could be made in a few generations of experimental breeding; and the exclusion, of course, could be made one generation after the discovery.

This supposition will be recognised by many of you as a simplified case of Mendelian inheritance of a unit

character due to the presence or absence of a single determiner which can either be or not be in a germ or ovum, and which "segregates."

No case quite so simple as this can be true of human intellect but something approximating it has been suggested as perhaps true.

Suppose, on the other hand, that the germinal basis for intellect consists in the presence, in the germ or ovum, of one or more of four determiners — I_1 , I_2 , I_3 and I_4 — contributing amounts 1, 2, 3 and 4 of intellectual capacity. The fertilised ovum could then have any one of 256 different constitutions ranging from the entire absence of all these determiners to the presence of each one "duplex"—*i.e.*, in both germ and ovum. If such duplex presence meant that the two contributions combined additively, the original intellect of the individual could range from 0 to 20. Individuals, all of one same original intellect — 10 — might be of very different germinal constitutions, and so of very different possibilities in breeding. If two individuals, each of original intellect 10, were mated, it might be the case that their possible offspring would range in intellect from 0 to 20, or it might be that they could not go below 8 or above 12.

If the number of germinal determiners of intellect is increased to five or six, the task of telling the constitution of the germs produced by any individual of known original intellectual capacity is enormously increased; and the research needed to guide the best possible breeding of man is very, very much more laborious. Moreover, instead of hoping to bring man to the best possible status (subject to the appearance of new

desirable mutations) by a few brilliant rules for marriage, we must then select indirectly and gradually by parental achievement rather than directly by known germinal constitution, just as animal and plant breeders had to do in all cases until recently, and just as they still have to do in many cases. Only after an elaborate system of information concerning family histories for many generations is at hand, can we prophesy surely and control with perfect economy the breeding for a characteristic which depends on the joint contributions of five or six determiners. For it is just as hard to "breed in" a determiner that raises intellect or morality only one per cent. as it is to "breed in" one which raises it a hundred per cent.—provided, of course, the latter determiner exists. And it is thousands of times harder to discover the distribution of a determiner in the human race's germs when it is one of ten that determine the amount of a trait, than when it is one of two.

The germinal determination of intellect, morality, sanity, energy or skill is, so far as I can judge, much more like the second complex state of affairs than the first simple one. Important observations of the inheritance of feeble-mindedness and insanity have been made by Davenport, Goddard and Rosanoff, which they interpret as evidence that original imbecility is due to the absence of a single determiner, and that an originally neurotic, unstable mental organisation is explainable almost as simply. It is with regret that I must assure you that these observations are susceptible of a very different interpretation. Much as I should like to believe that these burdens on man's nature are each

carried in heredity in a single package, which selective breeding can shuffle off in a generation or so, I can not. A eugenics that assumes that intellect, morality, sanity, and energy are so many single niches in the germs which selective breeding can, by simple transfers, permanently fill, is, I fear, doomed to disappointment and reaction. I dare to believe that the time will come when a human being idiotic by germinal defect will be extinct like the dinosaur — a subject for curious fiction and for the paleontology of human nature; but I have no hope that such a change can be made with the ease with which we can change short peas to tall, curly-haired guinea pigs to sleek, or plain blossoms to mottled ones.

There is another fundamental question whose answer is needed for the most economical selective breeding of human nature, a question which time permits me only to mention, not to describe clearly. Stated as a series of questions, it is this: Do the germs which a man produces — his potential halves of offspring — represent a collection peculiar to *him*, or only a collection peculiar to some *line*, or *strain*, or *stock*, or *variety*, of mankind of which he is one exemplar?

Suppose a hundred men and a hundred women to exist, each with identical germinal constitutions, so that, say, in every case one-tenth of the germs (or ova) would be of quality 5; one-fifth, of quality 6; two-fifths, of quality 7; one-fifth, of quality 8; and one-tenth, of quality 9. Suppose that they mated and had five hundred offspring. Suppose that the best fifty of this second generation married exclusively among themselves; and similarly for the worst fifty. Would the offspring of *these* two groups differ, the children of the best fifty

being superior to the children of the worst fifty? Or would this third generation revert absolutely to the condition of the grandparental stock whence they all came; and be alike, regardless of the great difference in their parentage?

Does the selection of a superior man pay because his superiority is, in and of itself, a symptom of probable excellence in his germs; or only because his superiority is a symptom that he is probably of a superior "line" or strain?

That the second answer of each pair may be the true one, is a natural, though not, I think, an inevitable, inference from the work of Johanssen, Jennings and others. They have found selective breeding within any one pure line futile, save when some peculiar and rare variations have taken place within it. Their work is of very great importance and forms the best introduction to the general problem of the limits to human racial improvement. I regret that time is lacking to describe these studies of heredity within one "pure line." It is from such that eugenics may hope to learn valuable lessons in economy of effort and exactness of expectation. I have, however, already taken too much of your time with the problems of the exact laws whereby good men have good offspring and whereby breeding for strength, wisdom and virtue may be most effective.

In the few minutes that remain let me sum up what might perhaps have been entitled the A B C of eugenics in the realm of mind.

I have tried to show that, in intellect and character, men differ, by original nature, in some sort of corre-

spondence to the ancestry whence they spring, so that by selection of ancestry the intellect and character of the species may be improved; to show also that injurious by-products of such selective breeding are very easily avoided, if indeed they occur at all; and, finally, to state some of the problems whose answers will inform us of just how the original intellect and character of one man does correspond with that of his ancestors, and so of just the best ways to discover the best strains and to perpetuate them.

I hope to have made it clear that we have much to learn about eugenics, and also that we already know enough to justify us in providing for the original intellect and character of man in the future with a higher, purer source than the muddy streams of the past. If it is our duty to improve the face of the world and human customs and traditions, so that men unborn may live in better conditions, it is doubly our duty to improve the original natures of these men themselves. For there is no surer means of improving the conditions of life.

It is no part of my office to moralise on these facts. But surely it would be a pitiable thing if man should forever make inferior men as a by-product of passion, and deny good men life in mistaken devotion to palliative and remedial philanthropy. Ethics and religion must teach man to want the welfare of the future as well as the relief of the cripple before his eyes; and science must teach man to control his own future nature as well as the animals, plants, and physical forces amongst which he will have to live. It is a noble thing that human reason, bred of a myriad unreasoned happen-

ings, and driven forth into life by whips made æons ago with no thought of man's higher wants, can yet turn back to understand man's birth, survey his journey, chart and steer his future course, and free him from barriers without and defects within. Until the last removable impediment in man's own nature dies childless, human reason will not rest.

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